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	**Fundamentals of Environmental Engineering**						
2.2 Course coordinator			Lect. dr. eng. Horatiu Stefanie				
2.3 Seminar coordinator			Lect. dr. eng. Horatiu Stefanie				
2.4. Year of study	**1**	2.5 Semester	**2**	2.6. Type of evaluation	**E**	2.7 Type of discipline	compulsory

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

3.1 Hours per week	4	Of which: 3.2 course	2	3.3 seminar/laboratory	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					20
Additional documentation (in libraries, on electronic platforms, field documentation)					20
Preparation for seminars/labs, homework, papers, portfolios and essays					20
Tutorship					6
Evaluations					4
Other activities:					-

3.7 Total individual study hours	70
3.8 Total hours per semester	126
3.9 Number of ECTS credits	5

4. Prerequisites (if necessary)

4.1. curriculum	Basics of environmental science, Chemistry, Physics
4.2. competencies	-

5. Conditions (if necessary)

5.1 De desfăşurare a cursului	• Active and interactive learning conditions • PC, video projector
5.2 De desfăşurare a seminarului/laboratorului	• Practical-applicative learning conditions; • The deadline for projects will be established by mutual agreement with the students.

6. Specific competencies acquired

Professional competencies	• Creating an overview of the role of engineering in Environmental Protection; • Development of an engineering knowledge base; • Development of technical skills in order to quantitatively assess environmental impacts and select the best technologies; • Familiarization with various technologies applied in environmental protection; • Ability to select and use mathematical models; • The ability to propose realistic solutions from a constructive and material point of view.
Transversal competencies	• teamwork skills; • use of information and communication technology; • solving problems and making decisions; • applying efficient and responsible work strategies, punctuality, seriousness and personal responsibility.

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

7.1 General objective of the discipline	Students will be familiarized with the impacts on the environment, due to economic activities and engineering works in areas such as: air quality, water quality, waste management, noise and vibration, transport, industry, etc. Students will be able to analyze and build predictive models regarding the control of the level and extent of environmental impacts. Students will understand the procedures involved in environmental impact assessment and will be able to apply the knowledge by working individually or in multidisciplinary teams in case studies involving engineering aspects.
7.2 Specific objective of the discipline	**1. Knowledge and understanding** - the identification of terms, relationships, processes, the perception of relationships and connections within the field of Environmental Engineering; - the correct use of specialized terms from the field of Environmental Engineering; - the ability to correctly synthesize and interpret information. **2. Explanation and interpretation** - generalization, specialization, integration in the selection of the best available technologies; - making connections between aspects related to fundamental and applied sciences; - the capacity for analysis and synthesis in the decision-making process, by applying the acquired knowledge. **3. Instrumental-applications** - creation of useful engineering knowledge bases in the specialization of environmental engineer; - the description of states, systems, processes, phenomena that appear in the environment and the identification of the correlations between them; - the ability to put into practice the knowledge acquired during the course; - research skills, creativity in the field; - the ability to design projects at various scales. **4. Attitudinal** - involvement in scientific activities; - the ability to collaborate with specialists from other fields.

8. Content

8.1 Course	Teaching methods	Remarks
1. Global impacts. The Earth, transformed by human action I	COMMUNICATION: exposure, problematization of the exposed material TRAINING: interactive discussions OBSERVATION: case studies, mixed methods	
2. Global impacts. The Earth, transformed by human action II	COMMUNICATION: exposure, problematization of the exposed material TRAINING: interactive discussions OBSERVATION: case studies, mixed methods	
3. Global environmental problems	COMMUNICATION: exposure, problematization of the exposed material TRAINING: interactive discussions OBSERVATION: case studies, mixed methods	
4. Water management. Water pollution I	COMMUNICATION: exposure, problematization of the exposed material TRAINING: interactive discussions OBSERVATION: case studies, mixed methods	
5. Water management. Water pollution II	COMMUNICATION: exposure, problematization of the exposed material TRAINING: interactive discussions OBSERVATION: case studies, mixed methods	
6. Water management. Water pollution reduction technologies I	COMMUNICATION: exposure, problematization of the exposed material TRAINING: interactive discussions OBSERVATION: case studies, mixed methods	
7. Water management. Water pollution reduction technologies II	COMMUNICATION: exposure, problematization of the exposed material TRAINING: interactive discussions OBSERVATION: case studies, mixed methods	
8. Air quality management. Air pollution I.	COMMUNICATION: exposure, problematization of the exposed material TRAINING: interactive discussions OBSERVATION: case studies, mixed methods	
9. Air quality management. Air pollution II.	COMMUNICATION: exposure, problematization of the exposed material	

	TRAINING: interactive discussions OBSERVATION: case studies, mixed methods	
10. Air quality management. Pollutans removal techniques for air emissions II	COMMUNICATION: exposure, problematization of the exposed material TRAINING: interactive discussions OBSERVATION: case studies, mixed methods	
11. Air quality management. Pollutans removal techniques for air emissions II	COMMUNICATION: exposure, problematization of the exposed material TRAINING: interactive discussions OBSERVATION: case studies, mixed methods	
12. Soil resources management. Soil pollution	COMMUNICATION: exposure, problematization of the exposed material TRAINING: interactive discussions OBSERVATION: case studies, mixed methods	
13. Soil resources management. Soil decontamination techniques	COMMUNICATION: exposure, problematization of the exposed material TRAINING: interactive discussions OBSERVATION: case studies, mixed methods	
14. Decontamination of soils and groundwater polluted with organic chemical compounds.	COMMUNICATION: exposure, problematization of the exposed material TRAINING: interactive discussions OBSERVATION: case studies, mixed methods	

Bibliography

1. Nemerow, N. L, Agardy, F.J., Sullivan, P., Salvato, J.A. (2009), Environmental Engineering:Prevention and Response to Water-, Food-, Soil-, And Air-Borne Disease and Illness, Sixth Edition, ISBN: 978-0-470-08304-8, John Wiley & Sons, Inc.
2. Nemerow, N. L, Agardy, F.J., Sullivan, P., Salvato, J.A. (2009), Environmental Engineering: Water, Wastewater, Soil and Groundwater Treatment and Remediation Sixth Edition, ISBN 978-0-470-08303-1, John Wiley & Sons, Inc.
3. Lawrence K. Wang, Mu-Hao Sung Wang, (2022), Handbook of Environmental Engineering, Electronic ISSN 2512-1472, Springer ed.

8.2 Seminar / laboratory	**Teaching methods**	**Remarks**
1. Introductory seminar. Contents of ongoing activities. Presentation requirements.	COMMUNICATION: exposure, problematization of the exposed material TRAINING: interactive discussions, brainstorming; OBSERVATION: case studies, mixed methods	
2. Ecological footprint	COMMUNICATION: exposure, problematization of the exposed material TRAINING: interactive discussions, brainstorming;	

	OBSERVATION: case studies, mixed methods	
3. Air samples prelevation methods	COMMUNICATION: exposure, problematization of the exposed material TRAINING: interactive discussions, brainstorming; OBSERVATION: case studies, mixed methods	
4. Water necessity calculation, pollutant loads	COMMUNICATION: exposure, problematization of the exposed material TRAINING: interactive discussions, brainstorming; OBSERVATION: case studies, mixed methods	
5. Fieldtrip – environmental problems – Cluj-Napoca area;	COMMUNICATION: exposure, problematization of the exposed material TRAINING: interactive discussions, brainstorming; OBSERVATION: case studies, mixed methods	
6. Methods for evaluating pollutant emissions in the air	COMMUNICATION: exposure, problematization of the exposed material TRAINING: interactive discussions, brainstorming; OBSERVATION: case studies, mixed methods	
7. The use of mathematical models in the calculation of the dispersion of air pollutants	COMMUNICATION: exposure, problematization of the exposed material TRAINING: interactive discussions, brainstorming; OBSERVATION: case studies, mixed methods	
8. Emissions – EMEP/ EEA CORINAIR	COMMUNICATION: exposure, problematization of the exposed material TRAINING: interactive discussions, brainstorming; OBSERVATION: case studies, mixed methods	
9. Establishing emission limit values for a factory.	COMMUNICATION: exposure, problematization of the exposed material TRAINING: interactive discussions, brainstorming; OBSERVATION: case studies, mixed methods	
10. Field trips - water treatment plant Cluj-Napoca;	COMMUNICATION: exposure, problematization of the exposed material	

	TRAINING: interactive discussions, brainstorming; OBSERVATION: case studies, mixed methods	
11. USLE model	COMMUNICATION: exposure, problematization of the exposed material TRAINING: interactive discussions, brainstorming; OBSERVATION: case studies, mixed methods	
12. Preparation of an individual study (project type). Presentation and discussion of the proposed themes.	Team work, experiment;	
13. Preparation of an individual study (project type). Presentation and discussion of the proposed themes.	Team work, experiment;	
14. Laboratory colloquium		

Bibliography:

- EMEP/EEA air pollutant emission inventory guidebook 2019 Technical guidance to prepare national emission inventories, (2019), Luxembourg: Publications Office of the European Union;
- Dispersion model: https://www.weblakes.com/products/screen/index.html;
- Rapoarte de mediu, www.anpm.ro / raport-de-mediu;
- BAT/BREF documents https://eippcb.jrc.ec.europa.eu/reference/;
- Directive 2010/75/UE on industrial emissions (IED),
- Agricultural Research Service, USLE History, National Soil Erosion Research Laboratory: West Lafayette, IN, 2016

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 subjects covered aim to bring students up to date with the use of technologies in various aspects of human-environment interaction, providing them with a base of knowledge and useful skills in the identification and technical solution of environmental problems, skills appreciated by representative employers in the field related to the program .

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 dealt with in the course.	Exam	70 %
10.5 Seminar/Laboratory	- knowledge and understanding; - the ability to explain and interpretation;	- applied activities; certificates/laboratory/practical work/project etc.; - tests during the semester; - control themes;- activităţi ştiinţifice.	30 %

	- complete and correct resolution of requirements.		

10.6 Minimum performance standards
- The student knows what the main concepts are, recognizes and defines them correctly; - The specialized language is simple, but correctly used; - Minimum grade 5 at the seminar/laboratory; - To draft and support a project according to the framework content. Obtaining a grade of at least 5 is a condition for entering the exam

Date | Signature of course coordinator | Signature of seminar coordinator

05.12.2024

Date of approval | Signature of the head of department