

COURSE DESCRIPTION

Resurse energetice și mediu/Energetic resources and the environment

Academic year 2026-2027

1. Programme-related data

1.1. Higher Education Institution	Babeș-Bolyai University
1.2. Faculty	Faculty of Environmental Science and Engineering
1.3. Department	Environmental Science
1.4. Field	Environmental Science
1.5. Level of study	Master
1.6. Degree programme / Qualification	Gestiunea și protecția mediului/Environmental Management and Protection
1.7. Form of education	Full time

2. Course-related data

2.1. Course title	Resurse energetice și mediu/Energetic resources and the environment			Course code	NME4022
2.2. Course coordinator	Prof. Calin Baci				
2.3. Seminar coordinator	Prof. Calin Baci				
2.4. Year of study	1	2.5. Semester	II	2.6. Type of assessment	Exam
2.7. Course status	Compulsory			2.8. Course type	Specialisation subject

3. Total estimated time (hours per semester of teaching activities)

3.1. Number of hours per week	4	of which: 3.2. course	2	3.3. seminar/ laboratory/ project	2
3.4. Total of hours in the curriculum	56	of which: 3.5. course	28	3.6. seminar/ laboratory	28
Time allocation for individual study (IS) and self-taught activities (ST)					hours
Learning from textbooks, course materials, bibliography, and notes (IS)					32
Additional research in the library, on subject-specific electronic platforms, and on-site					26
Preparing seminars/ laboratories/ projects, assignments, reports, portfolios, and essays					20
Tutoring (professional guidance)					6
Examinations					4
Other activities [i.e.: two-way communication with the course coordinator/tutor]					6
3.7. Total hours of individual study (IS) and self-taught activities (ST)				90	
3.8. Total hours per semester				150	
3.9. Number of credits				6	

4. Prerequisites (where applicable)

4.1. curriculum-related	
4.2. skills-related	

5. Specific conditions (where applicable)

5.1. course-related	
5.2. seminar/laboratory-related	

6.1. Competencies resulting from the completion of the degree programme (as referred to in the curriculum)

Professional competencies	
Competency code	Competency
PC1	Analyzes and interprets spatial data and environmental protection information
PC2	Conducts integrated environmental studies
PC11	Prepares scientific, academic papers and technical documentation
PC12	Assesses environmental impact and risk
Transversal competencies	
Competency code	Competency
TC1	Processes information, ideas, and concepts
TC2	Collaborates in teams and networks
TC3	Uses digital devices and applications

6.2. Learning outcomes relevant to the degree programme (as referred to in the curriculum)

Learning outcomes targeted by the subject		
Competency code	Knowledge and comprehension	Specific academic skills
CP1, CP11, CT1	1. The student/graduate explains and describes concepts, theories, principles, and basic methods specific to fundamental disciplines and uses them appropriately in professional communication.	1. The student/graduate correctly uses the fundamental concepts of Environmental Science in diverse contexts.
CP1, CP6, CP7, CP11	2. The student/graduate demonstrates knowledge, understanding, correct use, and explanation of the specific terminology used in the field of Environmental Science, the main concepts and laws, as well as the characteristics of abiotic and biotic systems (from the perspective of the principles of organization and functioning of living matter.	2. The student/graduate defines, describes, and discusses/presents the major concepts in the field of Environmental Science.
CP9, CP11, CT2, CT3	6. The student/graduate recognizes, analyzes, and draws conclusions regarding concepts, theories, and methods from other fields convergent with the field of Environmental Science.	6. The student/graduate must achieve the transdisciplinary integration of knowledge in order to assess the carrying capacity of natural and biological systems for socioeconomic systems.

7. Subject-specific learning outcomes

Knowledge and comprehension
1. The student knows and understands the main issues of the energy resources management at a global scale
2. The student knows and understands the geological and geographical distribution of the conventional energy resources at a global scale
3. The student knows and understands the global competition for resources and the links to economy and politics
4. The student knows and understands the correlation between energy resources exploitation and the environmental effects at a local and global scale
Specific academic skills
1. Teamwork for solving concrete issues

2. Synthesis of complex notions and their practical use
3. Assessing specific challenges by critical thinking

8. Contents

8.1. Course	Teaching and learning methods	Remarks ¹
Conventional resources of energy, types, and the history of their development	Interactive lecture	
Petroleum genesis, occurrence and distribution at worldwide scale	Interactive lecture	
Depletion of oil resources, the peak-oil theory, the current reserves	Interactive lecture	
The international oil and gas market	Interactive lecture	
Economic and political crises generated by the access to energy resources	Interactive lecture	
Coal as a major energy resource, use, new methods of extraction and use	Interactive lecture	
Global distribution of the coal resources, degree of depletion, future prospective	Interactive lecture	
Hydroelectric power. Distribution of the potential, positive and negative effects. Is it hydroelectric power a green energy?	Interactive lecture	
Nuclear energy, how the electricity is obtained from nuclear power?	Interactive lecture	
Environmental effects of using nuclear energy	Interactive lecture	
Unconventional energy for heating and cooling	Interactive lecture	
Unconventional energy for electricity production	Interactive lecture	
Unconventional fuels	Interactive lecture	
Comparing conventional and unconventional energy sources	Interactive lecture	
Bibliography Deffeyes K (2008). Hubbert's Peak: The Impending World Oil Shortage (New Edition) Princeton University Press (September 29, 2008). ENI (2023), World Oil and Gas Review, Rome. European Renewable Energy Council (2010) Renewable Energy in Europe: Markets, Trends and Technologies, Earthscan. Gauß P. (2009) International Trade China: Coal, Oil and Gas, GRIN Verlag. Hunt J (1996). Petroleum geochemistry and geology, W. H. Freeman; Second Edition (October 15, 1995) International Energy Agency (2024) World Energy Outlook 2024. OECD Publishing. Kaltschmitt M., Streicher W., Wiese A. (2007) Renewable energy: technology, economics, and environment. Springer Verl. Luft G., Korin A. (2009) Energy security challenges for the 21st century: a reference handbook, ABC-CLIO. Moran D., Russell J.A. (2009) Energy security and global politics: the militarization of resource management, Routledge. Müller-Kraenner S. (2008) Energy security: re-measuring the world, Earthscan. Nersesian R.L. (2010) Energy for the 21st Century: A Comprehensive Guide to Conventional and Alternative Sources, M.E. Sharpe, Inc. Shankleman J. (2006) Oil, profits, and peace: does business have a role in peacemaking? US Institute of Peace. Wengenmayr R., Bürke T. (2008) Renewable energy: sustainable energy concepts for the future, Wiley-VCH. NCR (2010) Assessing the Effects of the Gulf of Mexico Oil Spill on Human Health: A Summary of the June 2010 Workshop, http://www.nap.edu/catalog/12949.html NCR (2018) Future Directions for the U.S. Geological Survey's Energy Resources Program, http://nap.edu/25141		
8.2. Seminar/ laboratory	Teaching and learning methods	Remarks
Genesis of coal and petroleum	Dialogue	

¹ For example, organisational aspects, recommendations for students, specific aspects relating to the course/seminar, such as inviting experts in the field, etc.

Peak oil theory. Practical applicability	Dialogue	
Economic and environmental efficiency of energy resources exploitation.	Solving applications	
Types of nuclear reactors and working principles.	Dialogue	
Disasters due to nuclear energy use. Case study	Dialogue	
Energy efficiency of the unconventional resources	Solving applications	
Designing a local system for the improving the energy independency of a small city	Individual or group project	

Bibliography

Deffeyes K (2008). Hubbert's Peak: The Impending World Oil Shortage (New Edition) Princeton University Press (September 29, 2008).
 ENI (2010), World Oil and Gas Review, Rome.
 European Renewable Energy Council (2010) Renewable Energy in Europe: Markets, Trends and Technologies, Earthscan.
 International Energy Agency (2004) Renewable energy: market & policy trends in IEA countries, OECD-IEA.
 Kaltschmitt M., Streicher W., Wiese A. (2007) Renewable energy: technology, economics, and environment. Springer Verl.
 Nersesian R.L. (2010) Energy for the 21st Century: A Comprehensive Guide to Conventional and Alternative Sources, M.E. Sharpe, Inc.
 Wengenmayr R., Bührke T. (2008) , Renewable energy: sustainable energy concepts for the future, Wiley-VCH.
 NCR (2018) Future Directions for the U.S. Geological Survey's Energy Resources Program, <http://nap.edu/25141>

9. Evaluation

Type of activity	9.1 Evaluation criteria ²	9.2 Evaluation methods ³	9.3 Percentage in the final grade
9.4. Course	Understanding the notions that have been discussed, capacity to use them in practical cases.	Exam	50%
	Synthesis of the acquired knowledge		
9.5. Seminary/ laboratory	Solving the practical themes that have been proposed, and the reliability of the results	Exam	50%
	The capacity to solve concrete applications.		
9.6 Minimum standard for passing			
Understanding the main notions that have been discussed			
The ability to synthesize data in order to obtain a complete view on the study topics			

10. SDG labels (Sustainable Development Goals)⁴

	<input type="radio"/>	Sustainable Development Generic Label
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² The evaluation criteria must directly reflect the learning outcomes targeted at the level of the degree programme respectively at the level of the subject. More specifically, the learning outcomes set out in the expected learning outcomes are assessed.

³ Both final evaluation methods and ongoing evaluation strategies should be established.

⁴ Select a single label which, according to the [Implementation of SDG labels in the academic process](#), best matches the subject. If the subject addresses sustainable development in a generic manner (i.e. by presenting/introducing the general framework of sustainable development, etc.), then the Sustainable Development generic label may be applied. If none of the labels describe the subject, select the last option: "No label applies."

								
								
								No label applies
								

Date of entry:
20/04/2026

Signature of course coordinator



Signature of seminar coordinator



Date of approval in the department:

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Signature of the head of department

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