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		**GENERAL BIOLOGY**					
2.2 Course coordinator		Univ. lect. Eliana Sevianu, PhD					
2.3 Seminar coordinator		Univ. lect. Eliana Sevianu, PhD					
2.4. Year of study	**I**	2.5 Semester	**II**	2.6. Type of evaluation	**C**	2.7 Type of discipline	Obl.

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					10
Additional documentation (in libraries, on electronic platforms, field documentation)					10
Preparation for seminars/labs, homework, papers, portfolios and essays					10
Tutorship					8
Evaluations					4
Other activities:					

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	N/A
4.2. competencies	N/A

5. Conditions (if necessary)

5.1. for the course	Course room equipped with a whiteboard, video projector, and laptop.
5.2. for the seminar /lab activities	Laboratory equipped with a video projector, laptop, and specific equipment. Vegetal and animal material, fixed preparations, measuring instruments, microscope, and binocular magnifiers / UBB Botanical Garden / UBB Zoology Museum / practical applications in the field

6. Specific competencies acquired

Professional competencies	• **Knowledge and understanding** (knowledge and appropriate use of general biology terms): Although a large amount of scientific information needs to be mastered within one semester, an interactive teaching methodology is used, allowing the student to gain an optimal level of knowledge. This helps the student develop a clear understanding of the living world based on the appropriate scientific terminology, general knowledge of the field, basic concepts, the importance of living organisms on Earth, the role of biota in sustaining life, environmental protection, the practical value of the field, and its interdisciplinary, multidisciplinary, and transdisciplinary relationships. • **Explanation and interpretation** (explaining and interpreting ideas, projects, processes, and both theoretical and practical contents of the discipline): Knowledge and understanding of the field are followed by the development of the ability to explain and interpret ideas, phenomena, processes, and the content of the discipline. Complex data regarding anatomy, morphology, systematics, and ecology require "intelligent explanation" to provide students with optimal information. Constant interactive collaboration between professor and student is used in both lectures and practical work (in the lab and field). Applied biology to the environment should be understood by students as a sustainable link between biota and their specific environment. The living world should be viewed in the context of evolution, adaptation to environmental conditions, and phylogenetic relationships. • **Instrumental – practical** (designing, leading, and evaluating specific practical activities; using methods, techniques, and tools for investigation and application): Through practical work, especially field activities, students will learn to recognize different plant species, animals, fungi, and habitat types. Identifying characteristic or even bioindicator species, understanding the domain, and explaining and interpreting specific phenomena are essential premises. These activities could ensure the development of abilities that allow those who master the discipline to be prepared to lead practical activities, initiate and manage projects, and successfully apply modern research methods and techniques.
Transversal competencies	• **Formation of an appropriate set of knowledge and skills**, based on which the student can develop a positive and responsible attitude toward the scientific field, adopt an evolutionary perspective, and, ultimately, contribute to the training of other specialists through serious collaboration with current professionals. For this, it is necessary for the course leader to emphasize not only the scientific formative aspect but also the civic, ethical, and moral ones. The future specialist in environmental issues must have solid knowledge but should also collaborate with other specialists, with the goal of their work benefiting the community they are part of, rather than just themselves. Achieving a modern attitudinal behaviour in applied biology to the environment is possible if previous stages are completed.

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

7.1 General objective of the discipline	The knowledge of fundamental concepts in general biology is crucial for any student in the field of environmental science or engineering. In particular,

	understanding the key areas of anatomy, morphology, ecology, phylogeny, and systematics of species is essential for developing a comprehensive understanding of how organisms are structured, how they function, and how they interact with each other and their environments.
7.2 Specific objective of the discipline	• Defining and consolidating the basic concepts and principles of general biology. • Knowledge, identification, and characterization of the main groups of living organisms and representative species. • Highlighting the particularities and characteristics in the relationships between living organisms on one hand, and between biota and the living environment on the other. • Students' acquisition of modern principles regarding the correlated study of biology, physiology, and ecology. • Analysing the influence of ecological factors on living organisms, the changes induced by these factors on the surrounding environment and finding theoretical and practical ways to define a state of balance between components. • Knowledge of the local biodiversity of various ecosystem categories, the cenotic composition of ecosystems, and highlighting specific communities for both undisturbed natural ecosystems and those modified by natural or anthropic factors.

8. Content

8.1 Course	Teaching methods	Remarks
1. **Biology within the environmental science.** Study domains. Definition of life. The cell – the structural and functional unit of living organisms. Classification of living organisms. Classification systems: the domains and kingdoms of life. Systematics and taxonomy. Eukaria. **Introduction to animal biology. Phylum Chordata, Subphylum Vertebrata: Mammalia** – characteristics, evolutionary, ecological, and ethological features, habitats, and representative species.	Free, interactive presentation with PowerPoint visualization support; thematic films, discovery-based learning, problem solving group discussions.	
2. **Phylum Chordata, Subphylum Vertebrata: Class Aves** – characteristics, evolutionary, ecological, and ethological features, habitats, and representative species.	Free, interactive presentation with PowerPoint visualization support; thematic films, discovery-based learning, problem solving group discussions.	
3. **Phylum Chordata, Subphylum Vertebrata: Class Reptilia** – characteristics, evolutionary, ecological, and ethological features, habitats, and representative species.	Free, interactive presentation with PowerPoint visualization support; thematic films, discovery-based learning, problem solving group discussions.	
4. **Phylum Chordata, Subphylum Vertebrata: Tetrapoda, Class Amphibia** – characteristics, evolutionary, ecological, and ethological features, habitats, and representative species.	Free, interactive presentation with PowerPoint visualization support; thematic films, discovery-based learning, problem	

	solving group discussions.	
5. **Phylum Chordata, Subphylum Vertebrata: Superclass Pisces** – characteristics, evolutionary, ecological, and ethological features, habitats, and representative species.	Free, interactive presentation with PowerPoint visualization support; thematic films, discovery-based learning, problem solving group discussions.	
6. **Phylum Arthropoda** – characteristics, evolutionary, ecological, and ethological features, habitats, and representative species.	Free, interactive presentation with PowerPoint visualization support; thematic films, discovery-based learning, problem solving group discussions.	
7. **Phyla: Annelida and Mollusca** – characteristics, evolutionary, ecological, and ethological features, habitats, and representative species.	Free, interactive presentation with PowerPoint visualization support; thematic films, discovery-based learning, problem solving group discussions.	
8. **INTRODUCTION TO PLANT BIOLOGY. DOMAIN EUKARYA – KINGDOM PLANTAE. PHYLUM BRYOPHYTA.** Moss morphology and structure. Origin and evolution. Life cycle and reproduction. Moss ecology. Ecological and economic importance.	Free, interactive presentation with PowerPoint visualization support; thematic films, discovery-based learning, problem solving group discussions.	
9. **DOMAIN EUKARYA – SUBKINGDOM CORMOBIONTA. PHYLUM PTERIDOPHYTA.** Seedless vascular plants. Ferns and related organisms. General characterization, life cycle, and reproduction. Ecology and evolution. Ecological and economic importance of ferns.	Free, interactive presentation with PowerPoint visualization support; thematic films, discovery-based learning, problem solving group discussions.	
10. **DOMAIN EUKARYA – PHYLUM PINOPHYTA.** Seed-producing plants. Gymnosperms. General characterization, life cycle, and reproduction. Ecology and evolution. Ecological and economic importance of gymnosperms.	Free, interactive presentation with PowerPoint visualization support; thematic films, discovery-based learning, problem solving group discussions.	
11. **DOMAIN EUKARYA – PHYLUM MAGNOLIOPHYTA.** Angiosperms. General characterization, life cycle, and reproduction. Ecology and evolution. Ecological and economic importance of flowering plants.	Free, interactive presentation with PowerPoint visualization support; thematic films, discovery-based	

	learning, problem solving group discussions.	
12. **PLANT ECOLOGY** Plants and their environment. Plant distribution. Concepts of phytogeography. The notion of endemic species. Extreme habitats and plant adaptations.	Free, interactive presentation with PowerPoint visualization support; thematic films, discovery-based learning, problem solving group discussions.	
13. DOMAIN EUKARYA – KINGDOM PROTISTA. KINGDOM FUNGI. General characters. Thallus morphology. Classification. Origin and evolution. Habitats. The human impact and ecological and economic importance of algae. Plasmodial organisms: structure, origin, and significance. General characters. Morphology. Reproduction and development. Nutrition. The economic and ecological importance of fungi. Symbioses: mycorrhizae and lichens. Characterization and significance. Bioindicators.	Free, interactive presentation with PowerPoint visualization support; thematic films, discovery-based learning, problem solving group discussions.	
14. DOMAINS ARCHAEA AND BACTERIA (KINGDOMS EUBACTERIA AND ARCHAEA). VIRUSES. The boundary between living and non-living. Phylogenetic trees. The origin and evolution of prokaryotes.	Free, interactive presentation with PowerPoint visualization support; thematic films, discovery-based learning, problem solving group discussions.	

Bibliography:

Collins, A. 2024. Understanding zoology. Independent publisher.

Covaciu-Marcov, S.V., Cicort-Lucaciu, A.Ş. 2009. Elemente de zoologie generală. Ed. Univ. Oradea

Cristea V. 1993. Fitosociologie şi vegetaţia României, Cluj-Napoca: 1-314.

Cristea V. 2014. Plante vasculare: diversitate, sistematică, ecologie şi importanţă. Presa Universitară Clujeană, Cluj-Napoca

Dawkins, R. 2004. The Ancestor's Tale. Boston: Houghton Mifflin.

Dawkins, R. 1976. The Selfish Gene (Gena egoistă). Oxford: Oxford University Press.

Donita, N., Ivan, D., Coldea, Gh., Sanda, V., Popescu, A., Chifu, Th,. Pauca-Comanescu, M., Mititelu, D., N. Boşcaiu, 1992. Vegetatia Romaniei, Bucuresti, Ed. Tehnica Agricola

Doniţă, N., Popescu, A., Paucă-Comănescu, M., Mihăilescu, S., Biriş, I. 2005. Habitatele din România. Ed. Tehnică Silvică, Bucureşti.

Godeanu, P. S. (Ed). 2010. Determinatorul ilustrat al florei și faunei României. Vasile Goldis University Press.

Hickman, C, Susan L. Keen, David J. Eisenhour, Allan Larson, and Helen I'Anson. 2024. *Integrated Principles of Zoology.* 19th ed. New York: McGraw-Hill

Huggett, R.J. Fundamentals of Biogheography. 1998. Routledge, London

Lane, N. 2009. Life Ascending: The Ten Great Inventions of Evolution. Profile Books.

Lane, N. 2015. The Vital Question: Why Is Life The Way It Is?. Profile Books

Miller S,H., Harley J.P., 2009. Zoology. WCB Publ., 759 pp.

Myers, N., Mittermeier, R., Mittelmeier, C., Fonseca, G., Kent, J. 2000. Biodiversity hotspots for conservaţion priorities. Nature 403: 853-858

Pârvu, M., 2020. Botanică sistematică Thallophyta, Presa Universitară Clujeană

Roberts, A. 2011. Evolution. The Human Story. Dorling Kindersley

Roberts, A. 2014. The Incredible Unlikeliness of Being: Evolution and the Making of Us. Heron Books.

Roberts, A. 2017. Tamed: Ten Species that Changed our World. Hutchinson Books.

Shubin, N. 2008. Your Inner Fish: A Journey Into the 3.5-Billion-Year History of the Human Body
Stern, K., Bidlack, J., Jansky, S. 2008. Introductory Plant Biology. McGraw-Hill.
Sutherland, J., Newton, I., Greed, R.(Ed.). 2000. The conservation handbook. Research, management and policy. Blackwell Science, Cambridge.
Weier, E., Stocking, R., Barbour, M., Rost, T. 1982. Botany. An introduction to plant biology. John Wiley and Sons
Willis, K.J, McElwain, J.C. 2002. The evolution of Plants. Oxford University Press
Winston J.E. 1999. Describing species, Practical taxonomic procedures for biologists. Columbia University Press, New York.

8.2 Seminar / laboratory	Teaching methods	Remarks
1. **Phylum Chordata: Subphylum Vertebrata: Class Mammalia –** General characteristics, use of identification keys, identifying species from Romania's fauna based on dentition and traces	Debate Heuristic conversation Demonstration Discovery learning Exercise.	
2. **Phylum Chordata: Subphylum Vertebrata: Class Aves** – General characteristics, use of identification keys, mobile applications, and websites for identifying species from Romania's fauna.	Explanation Debate Heuristic conversation Demonstration Discovery learning Exercise Problem-solving	
3. **Phylum Chordata: Subphylum Vertebrata: Class Reptilia -** recognition of general characteristics, use of identification keys, identification of species from the Romanian fauna, and their importance for the environment.	Explanation Debate Heuristic conversation Demonstration Discovery learning Exercise Problem-solving	
4. **Phylum Chordata: Subphylum Vertebrata: Tetrapoda. Class Amphibia -** recognition of general characteristics, use of identification keys, identification of species from the Romanian fauna, and their importance for the environment.	Explanation Debate Heuristic conversation Demonstration Discovery learning Exercise Problem-solving	Practical field trip
5. **Phylum Chordata: Subphylum Vertebrata (Superclass Pisces) Chondrichthyes and Osteichthyes -** recognition of general characteristics, use of identification keys, identification of species from the Romanian fauna, and their importance for the environment.	Explanation Debate Heuristic conversation Demonstration Discovery learning Exercise Problem-solving	UBB Zoological Museum
6. **Phylum Arthropoda (Chelicerata, Crustacea) –** recognition of general characteristics, use of identification keys, identification of species from Romanian fauna, and their importance for the environment.	Explanation Debate Heuristic conversation Demonstration Discovery learning Exercise Problem-solving	UBB Zoological Museum
7. **Phylum Arthropoda (Miriapoda, Hexapoda) –** recognition of general characteristics, use of identification	Explanation Debate Heuristic conversation Demonstration	

keys, identification of species from Romanian fauna, and their importance for the environment.	Discovery learning Exercise Problem-solving	
8. **Introduction to Plant Biology:** Laboratory Techniques and Apparatus. **Bryophytes.** Habitats, identification of life cycle stages, ecological and reproductive particularities – practical exercise, experiment	Discovery Explanation Examination of fresh and dry plant material Experiment Individual practical activities	
9. P**teridophyte.** Life cycle, observation of asexual reproduction structures, species identification – practical exercise	Discovery Explanation Examination of fresh and dry plant material Experiment Individual practical activities	
10. **Pinophyta.** Adaptations. Identification of representative species. Protected and rare species. Seed dispersal. Using a key for identifying common and cultivated species - practical exercise.	Discovery Explanation Examination of fresh and dry plant material Experiment Individual practical activities	Field activity
11. **Magnoliophyta.** Anatomy, physiology, and morphology of plants.	Individual practical work Thematic documentation	
12. **Ecology of plants**: Plants and their habitat. Phytogeography. Vegetation stratification. Examples of species and communities. Extreme habitats and plant adaptations.	Explanation Field observation Discovery Heuristic discussions Practical application	Botanical Garden
13. **Kingdom Fungi.** Saprophytic and parasitic fungi. Criteria for recognizing mushroom species. Analysis of spore prints. Using field guides – practical exercise.	Discovery Explanation Examination of fresh and dry material Experiment Individual practical activities.	
14. **Domains Archaea and Bacteria (Kingdoms Eubacteria and Archaea). Viruses.**	Discovery Explanation video materials	

Bibliography:

Birkett, A. 2017. Field guide to the trees of Britain and Europe. New Holland Publisher

Cristea, V., 1983. Practicum de Botanică sistematică. Universitatea Babeș-Bolyai Cluj-Napoca.

Cullen, J. 2006. Practical plant identification. Cambridge University Press.

David. A., Coroiu, I. 2011. Zoologia Vertebratelor. Practicum. Presa Universitară Clujeană.

Deliu, C. 2003. Morfologia și Anatomia Plantelor. UBB, Facultatea de Biologie și Geologie Johnson, O., More, D. 2020 Guide Delachaux des arbres d'Europe. Delachausx et Nestle

Godeanu, P. S. (Ed). 2010. Determinatorul ilustrat al florei și faunei României. Vasile Goldis University Press.

Locsmandi, C. Vasas, G. 2013. Ghidul culegătorului de ciuperci. Ciuperci comestibile și otrăvitoare. Editura Casa, Oradea

Miller S,H., Harley J.P., 2001. Zoology. WCB Publ., 759 pp.

Olsen, L., N. 2012. Animalele și urmele lor. MAST

Prodan, I., Buia, I. 1958. Flora mică ilustrată a R.P.R. Ed. Agrosilvică de Stat, București.

Rakosy, L. 2013. Fluturii diurni din România. Cunoaștere, protecție, conservare. Editura Mega.

Ryan, J.M. 2018. Mammalogy techniques. Lab Manual. Johns Hopkins University Press
Sârbu, I., Ștefan, N., Oprea, A. 2013. Plante vasculare din România: determinator ilustrat de teren. Editura Victor B. Victor
Sevianu, E. 2018. Biologie animală. Caiet de lucrări practice. Publicat online pe site-ul facultății.
Societatea Ornitologică Română. 2017. Ghid pentru identificarea păsărilor
Societatea Ornitologică Română. 2021. Atlasul păsărilor Clujului

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 course content and practical activities focus on practical, field-based knowledge and have been developed based on current science and discussions with representatives from the academic world, environmental NGOs, decision-makers, environmental authorities, and entrepreneurs in the field of environmental engineering.

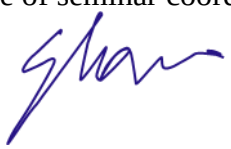
10. Evaluation

Type of activity	10.1 Evaluation criteria	10.2 Evaluation methods	10.3 Share in the grade (%)
10.4 Course	Volume of knowledge, understanding of concepts, synthesis ability, ability to make connections, and presentation style.	final written exam	50%
10.5 Seminar/lab activities	Degree of theoretical and practical preparation, the ability to recognize species and characterize them from taxonomic, phylogenetic, and ecological perspectives.	written test	50%

10.6 Minimum performance standards

Mastery of basic theoretical and practical knowledge in the field of general biology.
Understanding the phylogenetic relationships between groups of living organisms.
Development of skills in field and laboratory work.
Capacity to identify and recognize various species
Basic knowledge about ecological demands of various species
Use of specific devices and equipment.
Participation in at least 10 practical works.
Passing the exam is conditional on achieving a passing grade in both the laboratory and course exams. If a student passes only one exam, they can choose to retake the exam they failed in the resit session. For all subsequent exams, the student must take both parts.

Date 5.12.2024 Signature of course coordinator Signature of seminar coordinator



Date of approval Signature of the head of department