SYLLABUS

Phylogeography

University year 2025-2026

1. Information regarding the programme

1.1. Higher education institution	Babeș-Bolyai University
1.2. Faculty	Biology and Geology
1.3. Department	Taxonomy and Ecology
1.4. Field of study	Biology
1.5. Study cycle	Master's Degree, 4 semesters, full-time
1.6. Study programme/Qualification	Systemic Ecology and Conservation / Master's Graduate
1.7. Form of education	

2. Information regarding the discipline

2.1. Name of the discipline	**Phylogeography**					Discipline code	**BMR3103**
2.2. Course coordinator				Prof. dr. Mihai Pușcaș			
2.3. Seminar coordinator				Prof. dr. Mihai Pușcaș			
2.4. Year of study	1	2.5. Semester	1	2.6. Type of evaluation	E	2.7. Discipline regime	DS

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	126	of which: 3.5 course	28	3.6 seminar/laborator	**28**
Time allotment for individual study (ID) and self-study activities (SA) (se detaliază punctul 3.5. SI = 3.5.1+3.5.2.+3.5.3+3.5.4.+3.5.5+3.5.6.)					**hours**
Learning using manual, course support, bibliography, course notes (SA)					**10**
Additional documentation (in libraries, on electronic platforms, field documentation)					**24**
Preparation for seminars/labs, homework, papers, portfolios and essays					**20**
Tutorship					**10**
Evaluations					**6**
Other activities:					**0**
3.7. Total individual study hours	70				
3.8. Total hours per semester	126				
3.9. Number of ECTS credits	6				

4. Prerequisites (if necessary)

4.1. curriculum	-
4.2. competencies	-

5. Conditions (if necessary)

5.1. for the course	Logistical support (digital video projector)
5.2. for the seminar /lab activities	Logistical support (computers with Windows 7, 8, or 10 operating system) Digital video projector Mandatory attendance of students at a minimum of 80% of seminars

6.Specific competencies acquired [1]

Professional/essential competencies	• Understanding and knowledge of the general principles regarding biodiversity concepts and its levels of organization • Understanding and knowledge of spatial distribution patterns of intraspecific biodiversity and their determinants • Knowledge of the main refuge areas and post-glacial migration routes for Europe's flora and fauna, with a focus on Romania's biomes • Correct application of concepts such as intraspecific biodiversity, glacial refugia, and endemism
Transversal competencies	• Development of skills to apply knowledge gained from other disciplines such as Biogeography, Biogeography of Romania and Europe, Evolutionism, Ecology, Biodiversity Conservation, and Conservation Biology • Application of theoretical concepts to solve practical problems related to the conservation of intraspecific biodiversity and its implications for managing protected areas

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

7.1 General objective of the discipline	• Understanding and knowledge of the organization of intraspecific diversity, its geographical distribution, and its phylogenetic, phylogeographic, and historical significance
7.2 Specific objective of the discipline	• Understanding the general principles of the organization and spatial structuring of biological diversity • Understanding the significance of the main factors involved in the distribution of intraspecific biological diversity • Identifying and characterizing the main biogeographical regions that served as refugia during glacial periods for Europe's biodiversity • Understanding the ecological and historical factors that have shaped the current distribution of intraspecific biological diversity in Europe and Romania • Developing the ability to establish inter-, intra-, and multidisciplinary correlations within the complexity of biodiversity study

8. Content

8.1 Course	Teaching methods	Remarks
Introduction to phylogeography: concepts, methods	Frontal lecture, dialogue, interrogation	
Phylogeography: Landmark studies – development of the discipline and major historical milestones	Frontal lecture, dialogue, interrogation	
Quaternary climatic variations and their implications for the current distribution of biomes	Frontal lecture, dialogue, interrogation	
The concept of glacial refuge	Frontal lecture, dialogue, interrogation	
Molecular techniques used in phylogeographic studies (I)	Frontal lecture, dialogue, interrogation	

[1] One can choose either competences or learning outcomes, or both. If only one option is chosen, the row related to the other option will be deleted, and the kept one will be numbered 6.

Molecular techniques used in phylogeographic studies (II)	Frontal lecture, dialogue, interrogation	
Basic notions of population genetics	Frontal lecture, dialogue, interrogation	
Genetic diversity: interpretations of its spatial distribution	Frontal lecture, dialogue, interrogation	
Notions regarding the biogeography of the Carpathians	Frontal lecture, dialogue, interrogation	
Phytohistorical considerations: Quaternary glaciations and the phylogeography of plant species in Romania	Frontal lecture, dialogue, interrogation	
Phylogeographic patterns of animal species in the Carpathians and their conservation implications	Frontal lecture, dialogue, interrogation	
Phylogeography and its implications for managing current biodiversity (I)	Frontal lecture, dialogue, interrogation	
Phylogeography and its implications for managing current biodiversity (II)	Frontal lecture, dialogue, interrogation	
Inter- and intraspecific diversity: challenges of conservation	Frontal lecture, dialogue, interrogation	
Bibliography		
8.2 Seminar / laboratory	Teaching methods	Remarks
Journal Club exercises using representative articles in phylogeography	Presentation, Exercises, Individual Work	
Discussion of concrete examples regarding the main technical stages that led to the development of phylogeography	Presentation, Exercises, Individual Work	
Spatio-temporal information (geographical, historical) on macroclimatic variations and their interpretation	Presentation, Exercises, Individual Work	
Analysis of the concept of glacial refuge and its importance for various groups of organisms	Presentation, Exercises, Individual Work	
Notions regarding methods used in phylogeography: genetic markers (mitochondrial DNA in animals, chloroplast DNA)	Presentation, Exercises, Individual Work	
Notions regarding methods used in phylogeography: genetic markers (mitochondrial DNA in plants, nuclear DNA, perspectives)	Presentation, Exercises, Individual Work	
Notions regarding methods used in phylogeography: population genetics	Presentation, Exercises, Individual Work	
Analysis and interpretation of various patterns of intraspecific diversity: identification of glacial refuges and post-glacial colonization routes	Presentation, Exercises, Individual Work	
Biogeographical regions of the Carpathians: distribution, determinants, representative species	Presentation, Exercises, Individual Work	
Analysis and interpretation of various current patterns of intraspecific diversity for dominant and key species in Romania's major ecosystems (I): plant life	Presentation, Exercises, Individual Work	
Analysis and interpretation of various current patterns of intraspecific diversity for dominant and key species in Romania's major ecosystems (II): animal life	Presentation, Exercises, Individual Work	
Human activity and its influence on patterns of intraspecific diversity in wild fauna and flora: case studies	Presentation, Exercises, Individual Work	

The importance of glacial refuges for current biodiversity: case studies	Presentation, Exercises, Individual Work	
Various types of biodiversity: management measures	Presentation, Exercises, Individual Work	

Bibliography

Avise JC, Arnold J, Ball RM, Bermingham E, Lamb T, Neigel JE *et al* (1987). Intraspecific phylogeography: the mitochondrial DNA bridge between population genetics and systematics. *Annu Rev Ecol Syst* **18:** 489-522.

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Hurdu BI, Escalante T, Puscas M, Novikoff A, Bartha L, Zimmermann NE (2016). Exploring the different facets of plant endemism in the South-Eastern Carpathians: a manifold approach for the determination of biotic elements, centres and areas of endemism. *Biol J Linn Soc* **119:** 649-672.

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Puşcaş M, Taberlet P, Choler P (2008). No positive correlation between species and genetic diversity in European alpine grasslands dominated by *Carex curvula*. *Diversity and Distributions* **14:** 852-861.

Schönswetter P, Stehlik I, Holderegger R, Tribsch A (2005). Molecular evidence for glacial refugia of mountain plants in the European Alps. *Mol Ecol* **14:** 3547-3555.

Taberlet P, Gielly L, Pautou G, Bouvet J (1991). Universal Primers for Amplification of 3 Noncoding Regions of Chloroplast DNA. *Plant Mol Biol* **17:** 1105-1109.

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Tribsch A (2004). Areas of endemism of vascular plants in the Eastern Alps in relation to Pleistocene glaciation. *J Biogeogr* **31:** 747–760.

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 is updated, similar to those in other European universities, and is adapted to different levels of student preparation.
- The course content addresses practical aspects related to the distribution and conservation of biodiversity in Romania and Europe, with an applied character.
- During planned activities, students have the opportunity to propose solutions for improving the course and aligning its content with labor market requirements.

10. Evaluation

Activity type	10.1 Evaluation criteria	10.2 Evaluation methods	10.3 Percentage of final grade
10.4 Course	Knowledge of informational content	Oral Exam	100%
	Skills to read, interpret, and analyze a scientific text	Practical Exam	Practical Exam
10.6 Minimum standard of performance			
Knowledge of fundamental theoretical elements Ability to apply practical presentation methods			

11. Labels ODD (Sustainable Development Goals)[2]

Not applicable

Date:
9.01.2025

Signature of course coordinator

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Signature of seminar coordinator

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Date of approval:
10.01.2025

Signature of the head of department

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[2] Keep only the labels that, according to the *Procedure for applying ODD labels in the academic process*, suit the discipline and delete the others, including the general one for *Sustainable Development* – if not applicable. If no label describes the discipline, delete them all and write „*Not applicable*.".