SYLLABUS

Cell Type Diversity Development and Regulation

University year 2025 - 2026

1. Information regarding the programme

1.1. Higher education institution	Babeş-Bolyai University
1.2. Faculty	Biology and Geology
1.3. Department	Molecular Biology and Biotechnology
1.4. Field of study	Biology
1.5. Study cycle	Master, 4 semesters
1.6. Study programme/Qualification	Molecular Biotechnology/Master
1.7. Form of education	Full time

2. Information regarding the discipline

2.1. Name of the dis	scipli	ne Cell Type	Cell Type Diversity Development and Regulation				Discipline code	BME1203	
2.2. Course coordir	nator		CSI dr. Tudor				ıdor C. B	adea	
2.3. Seminar coordinator				CSI dr. Tudor C. Badea					
2.4. Year of study	1	2.5. Semester	2	2.6. Type of evaluation		С	2.7. Dis	cipline regime	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/laboratory	2
3.4. Total hours in the curriculum	56	of which: 3.5 course	28	3.6 seminar/laborator	28
Time allotment for individual study (ID) and se	elf-study activities (SA)		hours
Learning using manual, course support,	bibliograp	ohy, course notes (SA)			12
Additional documentation (in libraries, o	on electroi	nic platforms, field docu	mentatio	n)	22
Preparation for seminars/labs, homewo	rk, papers	, portfolios and essays			22
Tutorship					10
Evaluations					4
Other activities:					
3.7. Total individual study hours70					
3.8. Total hours per semester126					
3.9. Number of ECTS credits 5					

4. Prerequisites (if necessary)

4.1. curriculum	•	Genetics, Biochemistry, Cell and Molecular Biology.
4.2. competencies	•	Interpretation of scientific information

5. Conditions (if necessary)

5.1. for the course	MS teams platform Audio-video logistics
	· Multo-video logistics
E 2 for the cominar (lab activities	• Admission at final evaluation is conditioned by at least 80% attendance at
5.2. Ior the seminar /lab activities	the scheduled seminar/laboratory classes.

6. Specific competencies acquired ¹

Professional/essential competencies	 The student achieves analytical and synthesis skills in Molecular Biology, Genetic Engineering, cell type classification, and strategies for repair, regeneration or replacement of tissues. The student achieves analytical and synthesis skills of scientific information presented in English.
Transversal	 Acquisition of basic theoretical knowledge for future doctoral research in the field of Neuroscience,
competencies	Molecular Biology, Genetic Engineering, Immunology, Molecular Biotechnologies. Developing the ability to work alone or part of a team.

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

7.1 General objective of the discipline	• Acquiring general knowledge about cell type diversity, methods of studying cell types, and methods to manipulate cell types for scientific or therapeutic purposes.
7.2 Specific objective of the discipline	 Acquiring theoretical and practical knowledge about study and classification methodologies for cell types. Acquiring theoretical and practical knowledge about cellular mechanisms that lead to cell type diversity. Acquiring theoretical and practical knowledge about genetic manipulation techniques used in modern therapeutics.

8. Content

8.1 Course	Teaching methods	Remarks
1. Cell types as building blocks of living organisms. Properties and classification criteria.	In person or online on the MS teams platform. Interactive class participation	2 hours
2. General principles of cell type development. Cell division, cell type specification, cell type differentiation.	In person or online on the MS teams platform. Interactive class participation	2 hours
3. General principles of tissue morphogenesis.	In person or online on the MS teams platform. Interactive class participation	2 hours
4. Cell autonomous and transcriptional regulation of cell type formation.	In person or online on the MS teams platform. Interactive class participation	2 hours
5. Cell-Cell interactions in cell type development.	In person or online on the MS teams platform. Interactive class participation	2 hours
6. Molecular signals for cell type development.	In person or online on the MS teams platform. Interactive class participation	2 hours

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.

7. Neuronal Cell types	In person or online on the MS teams platform. Interactive class participation	4 hours
8. Immune system and Cancer - two particular cases of cell type diversification.	In person or online on the MS teams platform. Interactive class participation	4 hours
9. Molecular approaches to cell type study and manipulation.	In person or online on the MS teams platform. Interactive class participation	2 hours
10. Gene therapy	In person or online on the MS teams platform. Interactive class participation	2 hours
11. Cellular reprogramming, tissue replacement, repair and regeneration.	In person or online on the MS teams platform. Interactive class participation	4 hours

Bibliography

(1) Developmental Biology Scott F. Gilbert. 7th edition or 6th edition: https://www.ncbi.nlm.nih.gov/books/NBK9983/

(2) Molecular Biology of the Cell Alberts 5th edition or 4th edition: https://www.ncbi.nlm.nih.gov/books/NBK21054/ (3) Principles of Neuroscience Kandel Schwartz

(4) Purves Neuroscience

(5) Scientific articles from public databases (PubMed Central, SpringerLink, etc.) accessed via "LUCIAN BLAGA" Central University Library of Cluj-Napoca, Anelis

8.2 Seminar / laboratory	Teaching methods	Remarks		
Seminar: Students present papers relevant to	Seminar = student paper	14 hours		
the course material.	presentations and discussions.	1110015		
Laboratory:				
 Image Analysis using FIJI/IMAGEJ = 				
Neuronal Reconstructions				
2) Cell type classification based on gene	Demonstration followed by			
expression profiling using hierarchical	individual implementation by the	12 hours		
clustering (Matlab)	student based on assignment.			
3) Gene expression discovery and datamining				
of associated information using publicly				
available databases.				
Bibliography				
Scientific articles from public databases (PubMee	d Central SpringerLink etc.) accessed	d via LUCIAN BLAGA" Central		

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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 has a similar content to courses from other European universities, and is in sink with the students' • expertise level.
- The course is essential for the development of analytical and synthesis skills in Biotechnology, Molecular Biology, Cell diversity, and modern approaches for tissue repair and regeneration.

10. Evaluation

Activity type	10.1 Evaluation criteria	10.2 Evaluation methods	10.3 Percentage of final grade
10.4 Course	Assessment of knowledge	Written Exam	50%
10.5 Seminar/laboratory	Participation in the	Assessment during lab	25%

	analysis exercises during	exercises.	
	laboratory sessions		
	Ability to present and		
	summarize scientific	Paper presentations	25%
	information.		
10.6 Minimum standard of	performance		
• Knowledge of 50%	of the information content of	the course.	
 Involvement in at least 50% of the seminar's activities 			

11. Labels ODD (Sustainable Development Goals)²

General label for Sustainable Development							
	3 GOOD HEALTH AND WELL-BEING	4 QUALITY EDUCATION					9 INDUSTRY, INNOVATION AND INFRASTRUCTURE
			14 LIFE BELOW WATER	15 LIFE ON LAND			

Date: 06 12 2024	Signature of course coordinator	Signature of seminar coordinator		
00.12.2021	Senior Researcher Tudor C. Badea, PhD	Senior Researcher Tudor C. Badea, PhD		

Date of approval: 09.12.2024

Signature of the head of department Associate prof. Beatrice Kelemen, PhD

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."*.