SYLLABUS

Cell culture

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	Molecular Biology and Biotechnology
1.4. Field of study	Biology
1.5. Study cycle	Master, 2 years (4 semesters)
1.6. Study programme/Qualification	Molecular Biotechnology
1.7. Form of education	Full-time education

2. Information regarding the discipline

2.1. Name of the discipline	**Cell culture**					Discipline code	**BME1302**
2.2. Course coordinator					Alexandra Ciorîță		
2.3. Seminar coordinator					Alexandra Ciorîță		
2.4. Year of study	2	2.5. Semester	3	2.6. Type of evaluation	C	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	56	of which: 3.5 course	28	3.6 seminar/laborator	**28**
Time allotment for individual study (ID) and self-study activities (SA)					**hours**
3.5.1. Learning using manual, course support, bibliography, course notes (SA)					40
3.5.2. Additional documentation (in libraries, on electronic platforms, field documentation)					10
3.5.3. Preparation for seminars/labs, homework, papers, portfolios and essays					10
3.5.4. Tutorship					2
3.5.5. Evaluations					2
3.5.6. Other activities: Thematics					34
3.7. Total individual study hours	**98**				
3.8. Total hours per semester	**154**				
3.9. Number of ECTS credits	**6**				

4. Prerequisites (if necessary)

4.1. curriculum	General cytology, Biochemistry, General chemistry, Cellular and Molecular Biology
4.2. competencies	• Light microscopy • Concentrations • Scientific papers • Electronic platforms (Socrative, Mentimeter etc.) • Lab equipment

5. Conditions (if necessary)

5.1. for the course	Logistic video support Electronic support BBU libraries
5.2. for the seminar /lab activities	Minimum 80% attending at the practical courses will ensure the participation to the exam

6. Specific competencies acquired [1]

Professional/ essential competencies	• Understanding the behavior of cells in culture, acquiring the necessary knowledge to initiate cell cultures and use them for scientific or industrial purposes • Establishing the risks associated with cell cultures • Modification and adaptation of cell cultures to specific objectives • Conceiving the experimental design, obtaining measurement data, analyzing/interpreting them, and formulating conclusions
Transversal competencies	• Accomplishing the transfer of information, taking and using for the understanding of cell cultures knowledge from related fields: general cytology, animal physiology, biochemistry (metabolism), and genetics • Using already known notions in new contexts • The use of theoretical notions in solving practical problems • Developing the ability to work in a team

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

7.1 General objective of the discipline	• Knowledge of the general principles of cultivation and use of animal cells
7.2 Specific objective of the discipline	• Acquiring the necessary/complementary information to assimilate the content of the subjects of general cytology, biochemistry, animal physiology • Introduction to cell culture techniques of students who do not have experience in the field and ensuring the minimum knowledge necessary to organize a culture laboratory • Presentation of cell culture concepts and technologies at different levels • Development of the capacity for analysis and synthesis, the capacity to design and carry out experiments

8. Content

8.1 Course	Teaching methods	Remarks
1. Introduction to cell culture biology	Frontal lectures, team discussions, debates, didactic games, case studies, viewing educational videos	
2. Setting up a cell culture laboratory - International Standard Organization – ISO: protocols, safety, validation		
3. Contamination in the cell culture laboratory: Prevention and solutions		
4. Culture media: selection criteria		
5. Primary and secondary cultures		
6. 2D and 3D cell cultures		
7. Implementation of acquired notions in the biomedical environment		
8. Organoids		
9. Cell viability assays		
10. Membrane integrity tests		
11. Notions of cell biology – division, senescence, apoptosis and necrosis		
12. Biomedicine – the utility of acquired knowledge for medical applications		
13. Nanomaterials science – biocompatibility and biofunctionalization		
14. Applicability of the discipline to the labor market		
Bibliography		

[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.

1. MATHER, J. P., ROBERTS, P. E., 2002: Introduction to cell and tissue culture, Plenum Press, New York (Biblioteca de Fiziologie animală, uz intern - format electronic pus la dispoziție de cadrul didactic)
2. DAVIS, J., 2011: Animal cell culture: essential methods, Chichester, Wiley-Blackwell (Biblioteca de Fiziologie animală)
3. FRESHNEY, J.,, 2016: Culture of animal cells: a manual of basic technique and specialized applications, 7th ed., Wiley-Blackwell (Biblioteca de Fiziologie animală și Biblioteca de Zoologie)
4. BHATT, S., 2011: Animal cell culture: concept and application, Alpha Science Int., Oxford (Biblioteca de Fiziologie animală)
5 LANG, C, 2020: Culturi de celule, suport de curs [F1-F14].

Optional references
1. Mescher A, Junqueiras Basic Histology Text and Atlas, 14th Ed. McGraw Hall India, 2016.
2. Ross MH, Pawlina W. Histology A Text and Atlas With Correlated Cell and Molecular Biology, 7th ed. Volters Kluwel. 2015
3. Alberts B, Johnson A, Lewis J, Raff M, Roberts K, Walter P. Molecular Biology of the Cell, 6th Ed. Garland Publishing, New York, 2014.
4. Alberts B, Johnson A, Lewis J, Raff M, Roberts K, Walter P, Molecular Biology of the Cell, 5th Ed. Garland Publishing, New York, 2008.
5. Alberts B, Johnson A, Lewis J, Raff M, Roberts K, Walter P. Molecular Biology of the Cell, 4th ed., Garland Publishing, New York, 2002. http://www.ncbi.nih.gov/entrez/query.fcgi?db=Books
6. Brady ST, Siegel GJ, Albers RW, Price DL. Principles of Molecular, Cellular, and Medical Neurobiology, 8th Edition, Academic Press, 2011.
7. Dashek WV, Harrison M. Plant Cell Biology, 1st Edition, CRC Press. 2010.
8. Hunt T, Wilson J, The Problems Book: for Molecular Biology of the Cell, 6th Edition, Garland Science, 2015.
9. Kuehnel W, Color Atlas of Cytology, Histology, and Microscopic Anatomy, 4th Edition, 2003.
10. Lodish H, Berk A, Kaiser CA, Krieger M., Scott MP, Bretscher A, Ploegh H, Matsudaira P, Molecular Cell Biology, 6th Edition, 2007.
11. Lodish H, Berk A, Kaiser CA, Krieger M, Bretscher A, Ploegh H, Amon A, Martin KC, Molecular Cell Biology, 8th Edition, 2014.

8.2 Seminar / laboratory	Teaching methods	Remarks
1. Presentation of the way of carrying out the works; establishing work pairs and establishing the order of rotation; laboratory protection norms and PSI norms.	Frontal lecture	
2. Sterility test	Practical activity, subgroups of 2-3 students	
3. Preparation of special culture media		
4. The process of thawing cell cultures from -80°C stock		
5. Cell culture passage		
6. Applying a treatment to cell cultures		
7. Examination of cell cultures treated by biochemical techniques		
8. Examination of treated cell cultures by microscopic techniques (photonic, electronic)		
9. Freezing cell cultures		
10. Carrying out an individual study. Analysis, synthesis and integration activities of a scientific text of your choice	Individual practical activity, confrontation of ideas, debate, argumentation - group activity	
11. Carrying out an individual study. Analysis, synthesis and integration activities of a scientific text of your choice		
12. Carrying out an individual study. Analysis, synthesis and integration activities of a scientific text of your choice		
13. Carrying out an individual study. Analysis, synthesis and integration activities of a scientific text of your choice.		
14. Evaluation (examination) of laboratory work		Practical examination

Bibliography
Collection of reports for each laboratory work available at the department's library and online on the specialization's working group

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 the courses in other European universities and takes into account the level of preparation of the students
- The course is fundamental for the development of working skills in various laboratories, but in which modern methods of investigating life, at the cellular and molecular level, are applied.

10. Evaluation

Activity type	10.1 Evaluation criteria	10.2 Evaluation methods	10.3 Percentage of final grade
10.4 Course	Assimilation of informational content	Written exam	70%
	Enabling the use of concepts/notions		
10.5 Seminar/laboratory	Skills to work in the laboratory and to apply an experimental protocol	Practical evaluation at the end of the semester	30%
	Skills of analysis, synthesis and integration of a scientific text		
	The ability to explain the protocol and the results obtained		
10.6 Minimum standard of performance			
• Knowing at least 70% of the information contained in the course • Knowledge of at least 30% of the laboratory information			

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

	

Date:
09.12.2024.

Signature of course coordinator

Signature of seminar coordinator

Date of approval:
09.12.2024

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.*”.