SYLLABUS

1. Information regarding the programme

1.1 Higher education institution	**Babeş Bolyai University**
1.2 Faculty	**Faculty of Biology and Geology**
1.3 Department	**Department of Molecular Biology and Biotechnology**
1.4 Field of study	**Biology**
1.5 Study cycle	**Master**
1.6 Study programme / Qualification	**Bioinformatics applied in life sciences**

2. Information regarding the discipline

2.1 Name of the discipline (en) (ro)			**Cell and molecular biology** **Biologie celulară și moleculară**				
2.2 Course coordinator			**Lecturer Ioana Rusu, PhD**				
2.3 Seminar coordinator			**Lecturer Ioana Rusu, PhD**				
2.4. Year of study	**1**	2.5 Semester	**I**	2.6. Type of evaluation	**E**	2.7 Type of discipline	**Elective**
2.8 Code of the discipline		**BME1114**					

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					34
Additional documentation (in libraries, on electronic platforms, field documentation)					30
Preparation for seminars/labs, homework, papers, portfolios and essays					20
Tutorship					10
Evaluations					4
Other activities:					-

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	• Basic algebra calculation skills
4.2. competencies	• Average programming skills

5. Conditions (if necessary)

5.1. for the course	• Beamer • Online meeting platform
5.2. for the seminar /lab activities	• Attendance of a minimum of 90% of practical/ seminar classes, • Laboratory room with molecular cell biology dedicated equipment; • Computers, specific development environment

6. Specific competencies acquired

Professional competencies	• Ability to explain basic biological processes given the relationship that exists between cell structure and function • Ability to use appropriate fundamental methods for collecting, organizing, and analyzing molecular data • Advanced skills to translate a biological question into the design of an experiment
Transversal competencies	• To acquire biological knowledge from the cellular to the organismal level, with an interdisciplinary vision and special emphasis on computational applications • To manage and exploit specific concepts related to the molecular/cellular level of biological organization in new contexts

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

7.1 General objective of the discipline	• To demonstrate knowledge and understanding of the structural and functional aspects of eukaryotic cells and their subcellular constituents and to learn basic principles regarding how the genome orchestrates cell behavior (synthesis of macromolecules)
7.2 Specific objective of the discipline	• Describe different types of cells, especially eukaryotic cells; functional and structural similarities and dissimilarities between them • Describe the structure, function and dynamics of important biomolecules, organelles and other cellular components • Understand fundamental facts about cellular processes such as intracellular transports, cellular growth and division, and energy transformation • Explain how the growth, development, and behavior of organisms are activated through the expression of genetic information in context • Gain insight into the relevance of cell biological research to modern biology and medical science

8. Content

8.1 Course	Teaching methods	Remarks
Cell as a basic unit of life. Cell diversity.	• Interactive exposure • Presentation • Explanation • Practical examples • Case-study discussions	
Origin of life and the cells. Cell organization of prokaryotic and eukaryotic cells.		
Membrane structure. Transport across cell membranes.		
Intracellular compartments and protein transport.		
Energy generation in mitochondria and chloroplasts.		
The cytoskeleton and cell movement.		
Cell cycle, cell division - mitosis and meiosis		
Organization of the genome: DNA and chromosomes		

DNA replication		
Flow of genetic information, from DNA to protein: Transcription and Translation		

Bibliography

1. Alberts, B., Bray, D., & Hopkin, K. (2014). Essential cell biology. New York: Garland Science.
2. Campbell, N. A., Reece, J. B., & Urry, L. A. (2015). Biology: A global approach. Boston, MA: Pearson
3. Watson, J. D., Baker, T. A., & Bell, S. P. (2008). Molecular biology of the gene. Boston: Pearson.
4. Lodish, H. F., Berk, A., & Kaiser, C. A. (2013). Molecular cell biology. New York: W.H. Freeman and Company.
5. Cooper, G. M., & Hausman, R. E. (2009). The cell: A molecular approach. Washington, D.C: ASM Press.
6. Pierce, B. A. (2017). Genetics: A conceptual approach. New York: Macmillan Education

All references are available in hard print format at the libraries of the Faculty of Biology and Geology.

8.2 Seminar / laboratory	Teaching methods	Remarks
Practical work: Visualizing Cells (Light Microscope)	• Interactive exposure • Explanation • Conversation • Didactical demonstration	
Team-work project: Molecular biology of some important pathogens and/or particular human disease		
Seminar: Mutations (classification, molecular basis, repair, phenotypic consequence)		
Seminar: Unique features of organelle DNA (mitochondrial genome and chloroplast genome)		
Practical work: Isolation of genomic DNA from different cell types/environments		
Practical work: DNA quantification (UV absorbance, Agarose gel electrophoresis)		
Students project presentations, reflections and conclusions		
Final evaluation		

Bibliography

1. Alberts, B., Johnson, A., Lewis, J., Wilson, J. H., & Hunt, T. (2015). Molecular biology of the cell. Abingdon: Garland Science, Taylor & Francis Group.
2. Ausubel et al. (2003). Current Protocols in Molecular Biology. John Wiley & Sons Inc.

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 is present in the curriculum of many universities in the world.
- The course allows for developing fundamental skills in molecular biology theories and laboratory techniques for generating, processing, and understanding biological information needed for advanced bioinformatics analysis in pharmaceutical/biotechnology industries or in the academic and medical research workforce.

10. Evaluation

Type of activity	10.1 Evaluation criteria	10.2 Evaluation methods	10.3 Share in the grade (%)
10.1 Course	Know concepts and methods from the topics of the course	Written exam	50%

10.2 Seminar/lab activities	Apply tools and concepts of molecular cell biology in real-life problems	Team-work project (implementation and presentation) Short written colloquium	50%
10.3Minimum performance standards			
Each student should obtain minimum 5 for the written exam and for the final grade. In order to obtain the minimum grade 5, the student must demonstrate the mastery of the basic concepts described during the course.			

Date | Signature of course coordinator | Signature of seminar coordinator

1601.2023 | **Lect. Dr. Ioana Rusu** | **Lect. Dr. Ioana Rusu**

Date of approval | Signature of the head of department

20.01.2023 | **Assoc. Prof. Beatrice Kelemen, PhD**