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)			**Structural and functional genomics** **Genomică structurală și funcțională**			
2.2 Course coordinator			**Prof. Banciu Horia Leonard, PhD**			
2.3 Seminar coordinator			**Prof. Banciu Horia Leonard, PhD**			
2.4. Year of study	**1**	2.5 Semester				
2.8. Code of the discipline			**BME1121**			

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	24
Additional documentation (in libraries, on electronic platforms, field documentation)	20
Preparation for seminars/labs, homework, papers, portfolios and essays	14
Tutorship	8
Evaluations	4
Other activities:	-

3.7 Total individual study hours	**70**
3.8 Total hours per semester	**126**
3.9 Number of ECTS credits	**5**

4. Prerequisites (if necessary)

4.1. curriculum	• Genetics, Biochemistry, Cell and molecular biology
4.2. competencies	• Average computer 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, • Computers, specific environment for developing and implementing bioinformatic pipelines/tools

6. Specific competencies acquired

Professional competencies	• Development of the ability to explain the cellular phenotype as a consequence of the multidimensional interaction between genes, gene expression and translation products in a certain context of cellular life; • Ability to use bioinformatics strategies for analysis of genomes and genome function; • Development of the capacity for analysis, synthesis and communication of specialized scientific information
Transversal competencies	• Acquiring the necessary information / complementary to the assimilation of the content of the Proteomics disciplines. Transcriptomics, Applied genomics in human health, Individual bioinformatics project. • Using the specific concepts of genomic analysis to interpret the results or solve theoretical and experimental problems of functional genomics.

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

7.1 General objective of the discipline	• Describing the organization and structure of genomes in viruses, prokaryotes and eukaryotes, the modes of interaction between biological components that generate the cell phenotype, as well as bioinformatics tools for genomic analysis and genome functioning.
7.2 Specific objective of the discipline	• Knowledge of the main genomic sequencing technologies; • Knowledge of the general structure of viral, prokaryotic and eukaryotic genomes; • Understanding how an interaction between the components of a cellular biological network (genes, transcripts, proteins), as well as how these interactions contribute to the functioning of a cell: • Using the main computational strategies for genomic analysis, comparative and functional genomics.

8. Content

8.1 Course	Teaching methods	Remarks
The concept of the genome. Definition of genomics. Genome projects and databases (2 hours)	• Interactive exposure • Presentation • Explanation • Practical examples • Case-study discussions	
High-throughput DNA sequencing technologies (6 hours)		
Functional genomics technologies for RNA, protein and epigenetic modifications (6 hours).		
Structural and functional characteristics of viral, prokaryotic and eukaryotic (nuclear and organelles) genomes. Specialized databases and resources. (12 hours)		
Human genome structure and functions (2 hours)		

Bibliography

1. Caetano-Anolles G., Evolutionary genomics and systems biology. Hoboken, N. J. : Wiley-Blackwell, 2010.
2. Lesk A.M., Introduction to genomics. Oxford : Oxford University Press, 2017
3. Primrose S. B., Twyman R. M., Principles of gene manipulation and genomics. Malden, Mass ; Oxford ; Carlton, Victoria : Blackwell Publishing, 2006.
4. Xu S., Principles of statistical genomics. New York : Springer, 2013

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

8.2 Seminar / laboratory	Teaching methods	Remarks
Bioinformatic tools for genome assembling	• Interactive exposure • Explanation • Conversation • Practical demonstration • Case study	
Bioinformatic tools for comparative genomics		
Bioinformatic tools for phylogenomics		
Bioinformatic tools for functional genomics		
Functional annotation of genes: tools and databases		
Evaluation of a genomic or functional genomic short individual project	• Evaluation	

Bibliography

1. Hunt S., Functional genomics : a practical approach. Oxford : Oxford University Press, 2002.
2. Electronic resources, databases and bioinformatics tools available online

Reference (1) is available in printed format at the libraries of the Faculty of Biology and Geology.

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 promotes the gaining of theoretical knowledge and practical skills required for teamwork in the field of research and development in academic entities, but also in R&D units in private companies;
- The course is present in the curriculum of similar specializations at Romanian and foreign Universities.

10. Evaluation

Type of activity	10.1 Evaluation criteria	10.2 Evaluation methods	10.3 Share in the grade (%)
10.4 Course	Knowledge of concepts and methods from the topics of the course	Written exam (combined test)	50%
10.5 Seminar/lab activities	Evaluation of a genomic or functional genomic short individual project	Oral colloquium	50%
10.6 Minimum performance standards			
Each student should obtain minimum grade of 5 (five) for the written exam and oral colloquium. To obtain the minimum grade 5 (five), the student must demonstrate the mastery of the basic concepts described during the course and practicum classes.			

Date	Signature of course coordinator	Signature of seminar coordinator
10.07.2024	**Prof. Horia Banciu, PhD**	**Prof. Horia Banciu, PhD**

Date of approval
16.07.2024

Signature of the head of department
Assoc. Prof. Beatrice Kelemen, PhD