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)			**Genomics and functional genomics** **Genomică și genomică funcțională**				
2.2 Course coordinator			**Prof. Banciu Horia Leonard, PhD**				
2.3 Seminar coordinator			**Lecturer Baricz Andreea Ionela, PhD**				
2.4. Year of study	**1**	2.5 Semester	**2**	2.6. Type of evaluation	**E**	2.7 Type of discipline	**Compulsory**
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 development environment

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.	• Interactive exposure • Presentation • Explanation • Practical examples • Case-study discussions	
Massive DNA and RNA sequencing technologies.		
RNA, protein and metabolite analysis technologies.		
Characteristics of viral, prokaryotic and eukaryotic (nuclear and organelles) genomes		
Genomic analysis: complete genomes, genomic databases, comparative genomics.		
Human genome analysis: databases, analysis tools and case studies.		
Functional genomics: principles, tools, databases and case studies.		

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	

Bioinformatic tools for comparative genomics Bioinformatic tools for phylogenomics Bioinformatic tools for functional genomics Functional annotation of genes: tools and databases	• Explanation • Conversation • Practical demonstration • Case study	
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 (%)
10.1 Course	Knowledge of concepts and methods from the topics of the course	Written exam (combined test)	50%
10.2 Seminar/lab activities	Evaluation of a genomic or functional genomic short individual project	Oral colloquium	50%
10.3 Minimum performance standards			
Each student should obtain minimum 5 at the written exam and oral colloquium. In order to obtain the minimum grade 5, the student must demonstrate the mastery of the basic concepts described during the course and practicum classes.			

Date
16.01.2023

Signature of course coordinator
Prof. Horia Banciu, PhD

Signature of seminar coordinator
Lect. Andreea Baricz, PhD

Date of approval
20.01.2023

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