COURSE SYLLABUS
BIONANOTECHNOLOGIES

1. Data about 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	2 years, Full Time
1.6 Study Programme / Qualification	Master/ Molecular Biotechnology

2. Course data

2.1 Name of discipline	BIONANOTECHNOLOGIES (in English) (BME1201)						
2.2 Teacher responsible for lectures	Profesor dr. Manuela Banciu						
2.3 Teacher responsible for seminars	Profesor dr. Manuela Banciu						
2.4 Year of study	1	2.5 Semester	2	2.6. Type of evaluation	E	2.7 Course framework	DSIN

3. Estimated total time of teaching activities (hours per semester)

3.1 Hours per week	4	Out of which: 3.2 Lectures	2	3.3 Seminars / Laboratory classes	2
3.4 Total hours in the curriculum	126	Out of which: 3.5 Lectures	28	3.6 Seminars / Laboratory classes	28

Allocation of study time:	ore
Study supported by textbooks, other course materials, recommended bibliography and personal student notes	20
Additional learning activities in the library, on specialized online platforms and in the field	10
Preparation of seminars / laboratory classes, topics, papers, portfolios and essays	30
Tutoring	8
Examinations	2
Other activities: -	

3.7 Individual study (total hours)	70
3.8 Total hours per semester	126
3.9 Number of credits	5

4. Preconditions (where applicable)

4.1 Curriculum	• Biochemistry, Cell and Molecular Biology, Genetics.
4.2 Competences	• Interpretation of scientific information

5. Conditions (where applicable)

5.1 Conducting lectures	• MS teams platform • Audio-video logistics

5.2 Conducting seminars / laboratory classes	• Admission at final evaluation is conditioned by at least 80%attendances at the scheduled laboratory classes.

6. Specific competences acquired

Professional competences	• The student achieves analytical and synthesis skills in Biotechnologies, Nanotechnologies, Molecular Biology, Genetic Engineering, and Nanomedicine. • The student achieves analytical and synthesis skills of scientific information presented in Englsh.
Transversal competences	• Acquisition of basic theoretical knowledge for future doctoral research in the field of Bionanotechnologies, Genetic Engineering, Nanomedicine, Molecular Biotechnologies.Dezvoltarea capacităţilor de a lucra independent cat si in echipa.

7. Course objectives (based on the acquired competencies grid**)**

7.1 The general objective of the course	• Acquiring general knowledge about the importance of the bionanotechnologies in applicative research.
7.2 Specific objectives	• Acquiring theoretical knowledge about the practical application of biomaterials. • Acquiring theoretical knowledge about challenges of the bionanomachines in tight connection with biological barriers. • Acquiring theoretical knowledge about the practical application of the bionanosensors.

8. Content

8.1 Lectures	Teaching methods	Observations
1. Introduction to Nanotechnology and, respectively, Bionanotechnology. Brief history, interdisciplinarity, Nanomedicine.	Debate, interactive presentationbased on critical thinking.	2 hours
2. Applications of Bionanotechnologies: biomaterials, bionanosystems, bionanosensors, etc.	Debate, interactive presentationbased on critical thinking.	2 hours
3-4. Biomaterials: applications in Nanomedicine, Environmental Quality Monitoring, food industry, etc.	Debate, interactive presentationbased on critical thinking.	4 hours
5-6. Bionanosystems: applications in targeted therapy and imaging	Debate, interactive presentationbased on critical thinking.	4 hours
7. Modern techniques for obtaining and optimizing bionanosystems for biomedical applications.	Debate, interactive presentationbased on critical thinking.	2 hours
8. Artificial viruses: methods of obtaining, advantages and disadvantages.	Debate, interactive presentationbased on critical thinking.	2 hours

9-10. Bionanosensors: structure, biological recognition processes, types.	Debate, interactive presentationbased on critical thinking.	3 hours
10-11. Bionanosensors for biomedical applications	Debate, interactive presentationbased on critical thinking.	3 hours
12. Bionanosensors used to monitor air and water quality	Debate, interactive presentationbased on critical thinking.	2 hours
13. Molecular bionanosensors	Debate, interactive presentationbased on critical thinking.	2 hours
14. Biomaterials used in tissue engineering	Debate, interactive presentationbased on critical thinking.	2 hours
Bibliografie Scientific articles from public databases (PubMed Central, SpringerLink ,etc.) accessed via „LUCIAN BLAGA" Central University Library of Cluj-Napoca, Anelis		
8.2 Seminars / laboratory classes	Teaching methods	Observations
Seminars – problem-based learning: identification and optimization of bionanosystems with applications in targeted therapies	Seminars – problem-based learning	12 hours
Seminasr - presentation of reports/projects that address research in the field of Bionanotechnologies - presentations in English	Seminars based on critical thinking	16 hours
Bibliografie Scientific articles from public databases (PubMed Central, SpringerLink ,etc.) accessed via „LUCIAN BLAGA" Central University Library of Cluj-Napoca, Anelis		

9. Aligning the contents of the discipline with the expectations of the epistemic communityrepresentatives, professional associations and standard employers operating in the program field

- The course has a similar content to courses from other European universities
- The course is essential for the development of analytical and synthesis skills in Bionanotechnologies, Nanotechnologies, Molecular Biology, Genetic Engineering, and Nanomedicine.

10. Examination

Activity type	10.1 Evaluation criteria	10.2 Evaluation methods	10.3 Percentage of the final grade
10.4 Lectures	Assessment of knowledge	Exam-presentation of a project in the the field of Bionanotechnologies	50 %
10.5 Seminars/laboratory classes	Activity during seminars	Evaluation during the seminars	50 %
	Assessment of knowledge		
10.6 Minimum performance standard			

- Knowledge of 50% of the information content of the course as well as aquired from scientific articles
- Involvement in at least 50% of the seminars activities.

Date of issue	Signature of the teacher responsible for lectures	Signature of the teacher responsible for seminars/laboratory classess
11.07.2024	Prof. dr. Manuela Banciu	Prof. dr. Manuela Banciu

Date of approval in the department	Signature of the Head of the Department
17.07.2024	Conf. Dr. Beatrice Kelemen