

SYLLABUS

Academic year 2023 - 2024

1. Details about the program

1.1. Higher Education Institution	„Lucian Blaga” University of Sibiu
1.2. Faculty	Faculty of Sciences
1.3. Department	Environmental Sciences, Physics, Physical Education and Sports
1.4. Field of study	Biology
1.5. Study cycle ¹	Bachelor
1.6. Specialization	Biology

2. Details about the course

2.1. Course name	Techniques in molecular biology	Code	FSTI.MFE.BIOEN.L. CA.3.1100.C-5.9
2.2. Course coordinator	Lector Dr Boeraş Ioana		
2.3. Practical activity coordinator	Lector Dr Boeraş Ioana		
2.4. Year of study ²	2	2.5. Semester ³	1
2.6. Type of assessment ⁴			C
2.7. Type of discipline ⁵	A	2.8. Formative category of the discipline ⁶	S

3. Estimated total time

3.1. Proportion of the discipline within the curriculum – <i>number of hours / week</i>					
3.1.a.Lecture	3.1.b. Seminar	3.1.c. Laboratory	3.1.d. Project	3.1.e Other	Total
1	1				2
3.2. Proportion of the discipline within the curriculum – <i>number of hours / week</i>					
3.2.a.Lecture	3.2.b. Seminar	3.2.c. Laboratory	3.2.d. Project	3.2.e Other	Total ⁷
14	14				28
Allocation of time budget for individual study⁸					No. hours
Study based on textbook, lecture notes, bibliography and course notes					32
Additional research: library, specialized electronic platforms and field or on-site investigation and documentation					17
Preparing for the seminar / laboratorires, home assignments, reports, portfolios and essays					32
Tutoring ⁹					14
Examinations ¹⁰					2
3.3. Total number of hours for individual study¹¹ (NOSI_{sem})					97
3.4. Total number of hours in the curriculum (NOAD_{sem})					28
3.5. Total number of hours per semester¹² (NOAD_{sem} + NOSI_{sem})					125
3.6. No of hours / ECTS					25
3.7. Number of credits¹³					5

4. Prerequisites (if applicable)

4.1. Prerequisite courses for enrollment to this subject (from the curriculum) ¹⁴	
4.2. Competencies	

5. Requirements (wherever applicable)

5.1. Lecture organization and structure ¹⁵	<ul style="list-style-type: none"> - Videoprojector - Students need to sign up with Google Classroom using their ULBS e-mail 	
5.2. Organization and structure of practical activities (lab/sem/pr/other) ¹⁶	<ul style="list-style-type: none"> - Videoprojector - Blackboard - Students need to sign up with Google Classroom using their ULBS e-mail - Laboratory equipment required for the experiments 	

6. Specific competencies¹⁷

Number of credits assigned to the discipline ¹⁸			Distribution of credits according to competencies ¹⁹
6.1. Professional competencies	CP1	Ability to use notions, concepts, laws and specific principles related to molecular biology.	1
	CP2	Ability to explain the mechanisms involved in separation of DNA molecules through electrophoresis.	1
	CP3	Determining the size of a DNA molecule by means of DNA electrophoresis.	1
	CP4	Ability to explain the principles used in determining DNA sequence by use of the Sanger sequencing method.	1
	CP5	Ability to explain the principles used in DNA isolation.	1
6.2. Transversal competencies	CT1	Ability to execute a laboratory experiment – planning, making the reagents, executing the experiment and interpreting the results.	
	CT2	Ability to identify and organize bibliographic references relating to a given subject.	
	CT3	Analysis and communication of scientific information.	

7. Course objectives (reflected by the framework of specific competencies)

7.1. General objective	This subject introduces students in molecular biology and familiarizes them with the basic techniques used in this field by teaching students to isolate and analyze DNA molecules.
7.2. Specific objectives	O1. To correctly use the specific terminology in molecular biology. O2. To isolate DNA from different organisms. O3. To separate DNA molecules by electrophoresis and to determine their size. O4. To name the steps involved in gene cloning.

8. Course description

8.1. Lecture ²⁰	Teaching methods ²¹	No. of hours
Lecture 1 DNA – primary and secondary structure	Lecture, explanation, conversation.	2
Lecture 2 DNA isolation methods	Lecture, explanation, conversation.	2

Lecture 3 DNA electrophoresis – agarose and polyacrylamide gels	Lecture, explanation, conversation.	2
Lecture 4 Restriction enzymes – molecular scissors	Lecture, explanation, conversation.	2
Lecture 5 DNA amplification through PCR	Lecture, explanation, conversation.	2
Lecture 6 Sanger sequencing technique	Lecture, explanation, conversation.	2
Lecture 7 Gene cloning in various vectors	Lecture, explanation, conversation.	2
Total number of lecture hours:		14

8.2. Practical activities (8.2.a. Seminar ²² / 8.2.b. Laboratory ²³ / 8.2.c. Project ²⁴ / 8.2.d. Other practical activities ²⁵)	Teaching methods	No. of hours
Act.1 DNA extraction from plant cells	Explanation of working methods, experiment, exercise	2
Act.2 DNA extraction from animal cells	Explanation of working methods, experiment, exercise	2
Act.3 Electrophoresis in agarose gels	Explanation of working methods, experiment, exercise	2
Act.4 DNA digestion with restriction enzymes	Explanation of working methods, experiment, exercise	2
Act.5 PCR	Explanation of working methods, experiment, exercise	2
Act.6 Using agarose gels to determine the size of DNA fragments	Explanation of working methods, experiment, exercise	2
Act.7 Recap and oral evaluation	Explanation of working methods, experiment, exercise	2
Total number of hours: seminar/laboratory		14

9. Bibliography

9.1. Recommended references	Sambrook J, Fritsch E, Maniatis T. 1989. Molecular Cloning - A Laboratory Manual. Cold Spring Harbour Laboratory Press.
	Frederick Ausubel, 1995, Current protocols in molecular biology, John Wiley & Sons
	Alberts B, Johnson A, Lewis J, 2014, Molecular biology of the cell 6th edition, W. W. Norton & Company
9.2. Additional references	

10. Correlating the course description with the expectations and requirements of representatives of the epistemic community, professional associations and significant employers and stakeholders related to the study program and the specific area²⁶

Periodic interaction with the concerned organizations in order to correlate the course professional competencies and objectives with what is required in the work force.

11. Evaluate

Type of activity	11.1 Assessment criteria	11.2 Assessment methods		11.3 Percentage of the final grade	Notes. ²⁷
11.4a Exam / Colloquium	• Theoretical and practical knowledge (quantity, correctness, accuracy)	Midterm / ongoing assignments ²⁸ :	%	70 % (minimum 5)	
		Home assignments:	%		
		Other activities ²⁹ :	%		



		Final assessment:	70 % (min. 5)		
11.4b Seminar	<ul style="list-style-type: none"> Knowledge of equipment, methods of using specific instruments and tools; assessment of tools or achievements, processing and interpretation of results 	<ul style="list-style-type: none"> Oral examination Laboratory notebook, experimental work, scientific papers, etc 		30 % (minimum 5)	
11.4c Laboratory	•	•		% (minimum 5)	
11.4d Project	•	•		% (minimum 5)	
11.5 Minimum performance standard ³⁰ Ability to explain the principles used in DNA isolation from cells, in DNA separation by electrophoresis and DNA digestion with restriction enzymes.					

The course description includes components adapted to SEN (Special Educational Needs) persons, according to their type and degree, at all curricular elements and dimensions (competencies, objectives, course description, teaching methods, alternative assessment), in view of providing and ensuring equitable and fair opportunities to academic education for all students, with special attention to special educational needs.

Date of submission: |_2_|_5_| / |_0_|_9_| / |_2_|_0_|_2_|_3_|

Date of approval in the Department: |_1_|_9_| / |_1_|_0_| / |_2_|_0_|_2_|_3_|

	Degree, title, first name, surname	Signature
Course coordinator	Lecturer PhD. Ioana Boeraş	
Study program coordinator	Assoc. Prof. Ana-Maria Benedek-Sîrbu, PhD	
Director Departament	Lecturer PhD. Voichița GHEOCA	

¹ Licență / Master

² 1-4 pentru licență, 1-2 pentru master

³ 1-8 pentru licență, 1-3 pentru master

⁴ Examen, colocviu sau VP A/R – din planul de învățământ

⁵ Regim disciplină: O=Disciplină obligatorie; A=Disciplină opțională; U=Facultativă

⁶ Categoria formativă: S=Specialitate; F=Fundamentală; C=Complementară; I=Asistată integral; P=Asistată parțial; N=Neasistată

⁷ Este egal cu 14 săptămâni x numărul de ore de la punctul 3.1 (similar pentru 3.2.a.b.c.d.e.)

⁸ Liniile de mai jos se referă la studiul individual; totalul se completează la punctul 3.37.

⁹ Între 7 și 14 ore

¹⁰ Între 2 și 6 ore

¹¹ Suma valorilor de pe liniile anterioare, care se referă la studiul individual.

¹² Suma (3.5.) dintre numărul de ore de activitate didactică directă (NOAD) și numărul de ore de studiu individual (NOSI) trebuie să fie egală cu numărul de credite alocate disciplinei (punctul 3.7) x nr. ore pe credit (3.6.)

¹³ Numărul de credit se calculează după formula următoare și se rotunjește la valori vecine întregi (fie prin micșorare fie prin majorare)

$$\text{Nr. credite} = \frac{\text{NOCpSpD} \times C_C + \text{NOApSpD} \times C_A}{\text{TOCpSdP} \times C_C + \text{TOApSdP} \times C_A} \times 30 \text{ credite}$$

Unde:

- NOCpSpD = Număr ore curs/săptămână/disciplina pentru care se calculează creditele
- NOApSpD = Număr ore aplicații (sem./lab./pro.)/săptămână/disciplina pentru care se calculează creditele
- TOCpSdP = Număr total ore curs/săptămână din plan
- TOApSdP = Număr total ore aplicații (sem./lab./pro.)/săptămână din plan
- C_C/C_A = Coeficienți curs/aplicații calculate conform tabelului

Coeficienți	Curs	Aplicații (S/L/P)
Licență	2	1
Master	2,5	1,5
Licență lb. străină	2,5	1,25

¹⁴ Se menționează disciplinele obligatoriu a fi promovate anterior sau echivalente

¹⁵ Tablă, videoproiector, flipchart, materiale didactice specifice, platforme on-line etc.

¹⁶ Tehnică de calcul, pachete software, standuri experimentale, platforme on-line etc.

¹⁷ Competențele din Grilele aferente descrierii programului de studii, adaptate la specificul disciplinei

¹⁸ Din planul de învățământ

¹⁹ Creditele alocate disciplinei se distribuie pe competențe profesionale și transversale în funcție de specificul disciplinei

²⁰ Titluri de capitole și paragrafe

²¹ Expunere, prelegere, prezentare la tablă a problematicii studiate, utilizare videoproiector, discuții cu studenții (pentru fiecare capitol, dacă este cazul)

²² Discuții, dezbateri, prezentare și/sau analiză de lucrări, rezolvare de exerciții și probleme etc.

²³ Demonstrație practică, exercițiu, experiment etc.

²⁴ Studiu de caz, demonstrație, exercițiu, analiza erorilor etc.

²⁵ Alte tipuri de activități practice specifice

²⁶ Legătura cu alte discipline, utilitatea disciplinei pe piața muncii

²⁷ CPE – condiționează participarea la examen; nCPE – nu condiționează participarea la examen; CEF - condiționează evaluarea finală; N/A – nu se aplică

²⁸ Se va preciza numărul de teste și săptămânile în care vor fi susținute.

²⁹ Cercuri științifice, concursuri profesionale etc.

³⁰ Se particularizează la specificul disciplinei standardul minim de performanță din grila de competențe a programului de studii, dacă este cazul.