SYLLABUS

Academic year 2024 - 2025

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	Eng. PhD. Alexandra Maranciuc						
2.3. Practical activity coordinator	Eng. PhD. Alexandra Maranciuc						
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 – *number of hours / week*					
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 – *number of hours / week*					
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 study[8]	**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 study[11] ***(NOSI$_{sem}$)***	**97**
3.4. Total number of hours in the curriculum (*NOAD$_{sem}$*)	**28**
3.5. Total number of hours per semester[12] **(*NOAD$_{sem}$* + *NOSI$_{sem}$*)**	**125**
3.6. No of hours / ECTS	**25**
3.7. Number of credits[13]	**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]	Videoprojector or electronic bord
5.2. Organization and structure of practical activities (lab/sem/pr/other) [16]	Videoprojector, Blackboard , Laboratory equipment required for the experiments

6. Specific competencies[17]

Number of credits assigned to the discipline[18]		5	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 based on their molecular weight.	1
	CP3	Determining the optimal parameters for PCR reactions.	1
	CP4	Capacity to recognize and use the necessary restriction enzymes for each specific gene.	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.	0.5
	CT2	Ability to identify and organize bibliographic references relating to a given subject.	0.5
	CT3	Analysis and communication of scientific information.	0.25

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 determine the optimal parameters in a PCR reaction O4. To use restriction enzymes on different DNA fragments

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 Restriction enzymes – molecular scissors	Lecture, explanation, conversation.	2

Lecture 4 DNA amplification through PCR	Lecture, explanation, conversation.	2
Lecture 5 Cloning a gene into a vector	Lecture, explanation, conversation.	2
Lecture 6 Emerging techniques in molecular biology	Lecture, explanation, conversation.	2
Lecture 7 Final evaluation - Exam	Evaluation	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 Primers design	Explanation of working methods, experiment, exercise	2
Act.3 DNA amplification by PCR	Explanation of working methods, experiment, exercise	2
Act.4 PCR reaction optimization	Explanation of working methods, experiment, exercise	2
Act.5 DNA digestion with restriction enzymes	Explanation of working methods, experiment, exercise	2
Act.6 Separation of DNA molecules based on their molecular weight	Explanation of working methods, experiment, exercise	2
Act.7 Practical Evaluation	Evaluation	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 area[26]

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. Evaluare

Type of activity	11.1 Assessment criteria	11.2 Assessment methods		11.3 Percentage of the final grade	Notes.[27]
11.4a Exam / Coloquium	• Theoretical and practical knowledge (quantity, correctness,accuracy)	Midterm / ongoing assignments[28]:	%	60 % (minimum 5)	
		Home assignments:	%		
		Other activities[29]:	10%		
		Final assessment:	50 % (min. 5)		

11.4b Seminar	• Knowledge of equipment, methods of using specific instruments and tools; assessment of tools or achievements, processing and interpretation of results	• Practical examination	30% (min. 5)	40 % (minimum 5)	
		• Laboratory notebook, experimental work, scientific papers, etc • Participation at practical activities	10%		
11.5 Minimum performance standard[30] Ability to understand the principles behind the isolation of DNA molecules, their separation based on molecular weight and their 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: 12 / 09 / 2024

Date of approval in the Department: 17 / 09 / 2024

	Degree, titlle, first name, surname	**Signature**
Course coordinator	Eng. PhD. Alexandra Maraniuc	
Study program coordinator	Assoc. Prof. PhD. Ana-Maria Benedek-Sîrbu	
Director Departament	Lecturer PhD Ioan Tăușan	

[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 alocat 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*

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

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.*