

## 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 <sup>1</sup>	Bachelor
1.6. Specialization	Biology

### 2. Details about the course

2.1. Course name	<b>Basic genetics</b>	Code	FSTI.MFE.BIOEN.L. FO.4.2110.E-3.3
2.2. Course coordinator	Lector Dr. Boeraş Ioana		
2.3. Practical activity coordinator	Lector Dr. Boeraş Ioana		
2.4. Year of study <sup>2</sup>	2	2.5. Semester <sup>3</sup>	4
2.6. Type of assessment <sup>4</sup>	Exam		
2.7. Type of discipline <sup>5</sup>	O	2.8. Formative category of the discipline <sup>6</sup>	F

### 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
2	1	1			4
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 <sup>7</sup>
28	14	14			56
<b>Allocation of time budget for individual study<sup>8</sup></b>					<b>No. hours</b>
Study based on textbook, lecture notes, bibliography and course notes					5
Additional research: library, specialized electronic platforms and field or on-site investigation and documentation					1
Preparing for the seminar / laboratorires, home assignments, reports, portfolios and essays					4
Tutoring <sup>9</sup>					7
Examinations <sup>10</sup>					2
<b>3.3. Total number of hours for individual study<sup>11</sup> (NOS<sub>Isem</sub>)</b>					<b>19</b>
<b>3.4. Total number of hours in the curriculum (NOAD<sub>sem</sub>)</b>					<b>56</b>
<b>3.5. Total number of hours per semester<sup>12</sup> (NOAD<sub>sem</sub> + NOS<sub>Isem</sub>)</b>					<b>75</b>
<b>3.6. No of hours / ECTS</b>					<b>25</b>
<b>3.7. Number of credits<sup>13</sup></b>					<b>3</b>

#### 4. Prerequisites (if applicable)

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

#### 5. Requirements (wherever applicable)

5.1. Lecture organization and structure <sup>15</sup>	<ul style="list-style-type: none"> <li>- Students have to sign up with their institutional e-mail on Google Classroom</li> <li>- Classrooms need to be equipped with videoprojector and blackboard</li> </ul>
5.2. Organization and structure of practical activities (lab/sem/pr/other) <sup>16</sup>	<ul style="list-style-type: none"> <li>- Students have to sign up with their institutional e-mail on Google Classroom</li> <li>- Students read the preparatory materials offered by the professor</li> <li>- Classrooms need to be equipped with videoprojector and blackboard</li> </ul>

#### 6. Specific competencies<sup>17</sup>

Number of credits assigned to the discipline <sup>18</sup>			Distribution of credits according to competencies <sup>19</sup>
<b>6.1. Professional competencies</b>	CP1	Ability to define the basic concepts, theories and methods in the field of genetics.	1
	CP2	Define the genetic material, its structure and function.	1
	CP3	Understand the laws of heredity and apply them to monohybrid and dihybrid crosses.	0.5
	CP4	Make logical connections between basic genetics concepts and other related basic scientific fields.	0.5
<b>6.2. Transversal competencies</b>	CT1	Efficient work in multidisciplinary team on different hierarchical levels.	
	CT2	Analyze and communicate scientific information.	
	CT3	Documentation in Romanian and at least one foreign language for professional and personal development through training and effective adaptation to new scientific discoveries.	

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

7.1. General objective	To present the key concepts, principles and processes of genetics
7.2. Specific objectives	<p>O1. Define basic genetic concepts.</p> <p>O2. Describe the structure and function of the genetic material.</p> <p>O3. Describe the processes underlying hereditary transmission of characters.</p> <p>O4. Apply the laws of hereditary transmission to monohybrid and dihybrid crosses.</p> <p>O4. Highlighting how the genetic material change under the influence of the natural and artificial factors; presentation of the main groups of mutagens and their mode of action.</p>

#### 8. Course description

8.1. Lecture <sup>20</sup>	Teaching methods <sup>21</sup>	No. of hours
Lecture 1 Genetic material: Nucleic acids – DNA, RNA - their structure and role in heredity.	Lecture, explanation, conversation.	4
Lecture 2 Biochemical coding and genetic control - replication transcription, translation; genetic regulation.	Lecture, explanation, conversation, analysis of models, presentation of genetic structures and processes	4



Lecture 3 Mendelian inheritance. Mendelian laws of segregation and other segregation patterns.	Lecture, explanation, conversation.	4
Lecture 4 Cytogenetics: Cell division and genetic recombination in procariotes and eucariotes	Lecture, explanation, conversation, analysis of models, presentation of genetic structures and processes	4
Lecture 5 Chromosome theory of heredity and genetic mapping	Lecture, explanation, conversation.	2
Lecture 6 Sex inheritance. Sex chromosomes and sex-linked inheritance.	Lecture, explanation, conversation.	2
Lecture 7 Extra-nuclear inheritance in eucariotes – genes in mitochondria and plastides	Lecture, explanation, conversation.	2
Lecture 8 Mutations – clasification, molecular mechanism, mutagenesis and mutagic agents	Lecture, explanation, conversation.	2
Lecture 9 Morphological and numerical alterations of chromosomes	Lecture, explanation, conversation.	4
<b>Total number of lecture hours:</b>		<b>28</b>

<b>8.2. Practical activities (8.2.a. Seminar<sup>22</sup>/ 8.2.b. Laboratory<sup>23</sup>/ 8.2.c. Project<sup>24</sup> / 8.2.d. Other practical activities<sup>25</sup>)</b>	<b>Teaching methods</b>	<b>No. of hours</b>
Act. 1 Mendelian inheritance – the monohybrid cross	Explanation of working methods, exercises	2
Act. 2 Mendelian inheritance – the dihybrid and trihybrid cross	Explanation of working methods, exercises	2
Act. 3 Cytogenetics <i>Cytogenetics of plants</i> - Chromosome staining in plants; Mitotic index calculation	Explanation of working methods, slide examination and discusion	2
Act. 4 <i>Cytogenetics of animals</i> - Chromosome staining in animals <i>Human chromosomes, normal and modified human cariotype; sexual chromatine.</i>	Explanation of working methods, slide examination and discusion	2
Act. 5 Numerical alteration of the genetic matherial – poliploidy: methods to induce poliploidy; methods for ploidy analysis	Explanation of working methods, material examination and discusion	2
Act. 6 Genetic maps - Chromosome Mapping in Eukaryotes	Explanation, case studies	2
Act. 7 Quantitative and qualitative traits- introduction in quantitative genetics	Discussions and exercises	2
Act. 8 Genom– structure and polymorphysm	Lecture, conversation, presentation of papers	2
Act. 9 Linkage and genetic recombination	Lecture, conversation, presentation of papers	2
Act. 10 Mendelian inheritance	Lecture, conversation, applications	2
Act. 11 Bacterial genetics	Lecture, conversation, presentation of papers	2
Act. 12 Mutations	Lecture, conversation, presentation of papers	2
Act. 13 Genetics of sex determination	Lecture, conversation, presentation of papers	2
Act. 14 Extra-nuclear heredity	Lecture, conversation, presentation of papers	2
<b>Total number of hours: seminar/laboratory</b>		<b>28</b>

## 9. Bibliography

9.1. Recommended references	Lewin, Benjamin, 2007. "Genes IX". Jones Bartlett Publishers.
	Russell P.J., 2006. Genetics: A Mendelian Approach. Pearson/Benjamin Cummings.
	Snyder, Larry, Wendy Champness, 1997. Molecular Genetics of Bacteria.
	Hartl, Daniel L., Elizabeth W. Jones, 1997. Genetics: Principles and Analysis, 4 <sup>th</sup> Edition.
	Klug, William S., Michael R. Cummings, Charlotte A. Spencer, Michael A. Palladino, 2009. Concepts of Genetics. Benjamin Cummings, Cloth.
9.2. Additional references	Hammersmith R. L., Thomas R. Mertens, 2006. Genetics Laboratory Investigations, 13 <sup>th</sup> Edition, Benjamin-Cummings Publishing Company.
	Griffiths, Anthony J. F., Jeffrey H. Miller, David T. Suzuki, Richard C. Lewontin, William M. Gelbart, 2000. An Introduction to Genetic Analysis. 7th ed. New York: W. H. Freeman.
	Friedberg, E.C., Graham C. Walker, Wolfram Siede, Richard D. Wood, 2005. DNA Repair and Mutagenesis. American Society for Microbiology Press.

## 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<sup>26</sup>

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. <sup>27</sup>
11.4a Exam / Colloquium	• Theoretical and practical knowledge (quantity, correctness, accuracy)	Midterm / ongoing assignments <sup>28</sup> :	%	70% (minimum 5)	
		Home assignments: 2 assignments at the beginig and middle of the term	20%		
		Other activities <sup>29</sup> :	%		
		Final assessment: multiple choice test	50% (min. 5)		
11.4b Seminar	• Frequency/relevance of contributions or answers	Proof of contributions, portfolio (scientific papers, syntheses)		15% (minimum 5)	
11.4c Laboratory	• Knowledge of equipment, methods of using specific instruments and tools; assessment of tools or achievements, processing and interpretation of results	• Oral examination • Laboratory notebook, experimental work		15% (minimum 5)	
11.4d Project	•	•			
11.5 Minimum performance standard <sup>30</sup> Define the genetic material, its structure and function and understand the laws of heredity and apply them to monohybrid and dihybrid crosses.					

**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\_|

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

<sup>1</sup> Licență / Master

<sup>2</sup> 1-4 pentru licență, 1-2 pentru master

<sup>3</sup> 1-8 pentru licență, 1-3 pentru master

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

<sup>5</sup> Regim disciplină: O=Disciplină obligatorie; A=Disciplină opțională; U=Facultativă

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

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

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

<sup>9</sup> Între 7 și 14 ore

<sup>10</sup> Între 2 și 6 ore

<sup>11</sup> Suma valorilor de pe liniile anterioare, care se referă la studiul individual.

<sup>12</sup> 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.)

<sup>13</sup> Numărul de credite 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<sub>C</sub>/C<sub>A</sub> = 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

<sup>14</sup> Se menționează disciplinele obligatoriu a fi promovate anterior sau echivalente

<sup>15</sup> Tablă, videoproiector, flipchart, materiale didactice specifice, platforme on-line etc.

<sup>16</sup> Tehnică de calcul, pachete software, standuri experimentale, platforme on-line etc.

<sup>17</sup> Competențele din Grilele aferente descrierii programului de studii, adaptate la specificul disciplinei

<sup>18</sup> Din planul de învățământ

<sup>19</sup> Creditele alocate disciplinei se distribuie pe competențe profesionale și transversale în funcție de specificul disciplinei

<sup>20</sup> Titluri de capitole și paragrafe

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

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

<sup>23</sup> Demonstrație practică, exercițiu, experiment etc.

<sup>24</sup> Studiu de caz, demonstrație, exercițiu, analiza erorilor etc.

<sup>25</sup> Alte tipuri de activități practice specifice

<sup>26</sup> Legătura cu alte discipline, utilitatea disciplinei pe piața muncii

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

<sup>28</sup> Se va preciza numărul de teste și săptămânile în care vor fi susținute.

<sup>29</sup> Cercuri științifice, concursuri profesionale etc.

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