SYLLABUS

Academic year 2025 - 2026

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	**PLANT PHYSIOLOGY**		Code	FSTI.MFE.BIOEN.L.FO.3.2020.E-5.2	
2.2. Course coordinator	Associate professor. Alexandra Zamfir Ph.D				
2.3. Practical activity coordinator	Asistant lecturer. Mihai-Tudor Crăciunaş Ph.D				
2.4. Year of study[2]	II	2.5. Semester[3]	III	2.6. Type of assessment[4]	E
2.7. Type of discipline[5]	O	2.8. Formative category of the discipline[6]			F

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
2	-	2	-	-	**4**
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]
28	-	28	-	-	**56**

Allocation of time budget for individual study[8]	**No. hours**
Study based on textbook, lecture notes, bibliography and course notes	25
Additional research: library, specialized electronic platforms and field or on-site investigation and documentation	14
Preparing for the seminar / laboratorires, home assignments, reports, portfolios and essays	14
Tutoring[9]	10
Examinations[10]	6

3.3. Total number of hours for individual study[11] ***(NOSI$_{sem}$)***	**69**
3.4. Total number of hours in the curriculum (*NOAD$_{sem}$*)	**56**
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]	Biochemistry, Plant cytology, anatomy and morphology
4.2. Competencies	-

5. Requirements (wherever applicable)

5.1. Lecture organization and structure[15]	Computer, projector
5.2. Organization and structure of practical activities (lab/sem/pr/other) [16]	Plant physiology laboratory (microscope, chemical reagent, utensils and specific equipment, water sources, gas, current, projector, computer, fresh and preserved biological material, boards)

6. Learning outcomes [17]

Number of credits assigned to the discipline: 4				
Learning outcomes				Credit allocation based on learning outcomes
No.	Knowledge	Aptitudes	Responsibility and autonomy	
LO 1	The student/graduate describes, defines and discusses fundamental principles in the field of Biology, as well as interdisciplinary aspects (for example: Evolutionism, General Ecology, Plant Physiology, Animal Physiology).	The student/graduate applies working methods using modern instruments/equipment and classic laboratory techniques to perform, design experiments, record and appropriately analyze the results obtained.	The student/graduate uses their own knowledge and experiences to develop the scientific community and society in general by participating in professional and/or community activities.	1
LO 2	The student/graduate correctly uses and explains the specific terminology used in the field of Biology, the main concepts and laws, the characteristics of biological systems from the perspective of the principles of organization and functioning of living matter.	The student/graduate defines, describes, discusses/presents major concepts in the field of Biology.	The student/graduate demonstrates responsibility and autonomy in the use of scientific knowledge in the field of Biology, by conducting research, developing or improving concepts, theories, operational methods or biotechnological products, assuming ethical and professional decisions within the scientific process.	0.5
LO 3	The student/graduate defines, explains and exemplifies basic and modern experimental techniques in the analysis and characterisation of	The student/graduate uses, investigates and critically analyzes the principles of operation and use of equipment/instruments, techniques/working	The student/graduate applies knowledge learned in other courses to explain the interactions of organisms with the environment.	0.5

	biological systems, records and presents experimental results and explains the principles of scientific methods.	methods for investigating the functioning of biological systems.		
LO 4	The student/graduate analyzes, evaluates and uses concepts, theories and methods from other fields in the field of Biology	The student/graduate achieves transdisciplinary integration of knowledge in order to evaluate the support capacity of biological systems for socio-economic systems.	The student/graduate demonstrates initiative and self-control, capacity for anticipation and prospective evaluation, courage and perseverance in achieving goals.	0.5
LO 5	The student/graduate accurately applies fundamental notions in the field of Biology in various contexts.		The student/graduate demonstrates negotiation skills, empathy and assertive communication, leadership, teamwork, conflict management, team management, and public speaking.	0.5
			The student/graduate identifies the different contexts and opportunities for putting ideas into practice in personal, social and professional activities, as well as an understanding of how these may arise.	0.5
			The student/graduate demonstrates the ability to operate with appropriate information/documentation/knowledge methods and instructs students, colleagues, students, and other persons in a scientific manner.	0.5

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

7.1. General objective	Understanding the notions related to plant physiology, the physiological processes that take place in plant organisms under optimal and stress conditions. Studying the metabolic mechanisms on the basis of which they tolerate and resist the minimum and maximum variations of environmental factors.
7.2. Specific objectives	Informing students with theoretical and practical notions necessary for biology teachers, biochemists in the laboratory, environmental agents, etc. Through the skills received by students in the physiology laboratory, the foundations are laid for a conscious protection of flora and fauna, but also of the environment on which they depend. Identification of biochemical reactions of photosynthesis, respiration, etc. Knowledge of secondary biochemical products of plant metabolism with a role in the

	geographical spread of plants, as well as their resistance to "stepfather" environmental factors. Formation of positive attitudes towards the most appropriate behavior to respect the norms of vegetation protection, based on the knowledge of its role in ecosystems. Understanding the notion of stress as a deviation from the optimal condition for the plant. The study of plant metabolic mechanisms on the basis of which they tolerate and resist the minimum and maximum variations of environmental factors. Developing the capacity to investigate/research the physiological processes and adaptation of plants to the environment. The formation of observation and experimentation skills through which plants are subjected to normal or harmful factors, resulting from environmental pollution.

8. Course description

8.1. Lecture[18]	**Teaching methods**[19]	**No. of hours**
Lecture 1 Introduction to plant ecophysiology. Notions of cell physiology: Plant cell metabolism; The physiology of cellular organelles;	Interactive lecture, explanation, conversation, problem solving	2
Lecture 2 The role of mineral elements in cell metabolism.	Interactive lecture, explanation, conversation, problem solving	2
Lecture 3 The role of some ecological factors in the life of plants The role of water in plant life plant - water: - the absorption - the transport - the elimination - stress resistance	Interactive lecture, explanation, conversation, problem solving	2
Lecture 4 The role of environmental factors	Interactive lecture, explanation, conversation, problem solving	2
Lecture 5 The role of mineral salts in plant life - the mineral nutrition	Interactive lecture, explanation, conversation, problem solving	2
Lecture 6 The role of mineral salts in plant life - the elimination - the accumulation - the ecophysiological adaptations	Interactive lecture, explanation, conversation, problem solving	2
Lecture 7 The role of light in plant life - photosynthesis/generalities	Interactive lecture, explanation, conversation, problem solving	2
Lecture 8 The stages of photosynthesis	Interactive lecture, explanation, conversation, problem solving	2
Lecture 9 The ecological factors of photosynthesis	Interactive lecture, explanation, conversation, problem solving	2
Lecture 10 Energy generation - the role of respiration in energy production	Interactive lecture, explanation, conversation, problem solving	2
Lecture 11 The respiratory quotient	Interactive lecture, explanation, conversation, problem solving	2

Lecture 12 The ecological factors of breathing The adaptations of respiration to anaerobic conditions	Interactive lecture, explanation, conversation, problem solving	2
Lecture 13 The movement of plants	Interactive lecture, explanation, conversation, problem solving	2
Lecture 14 Allelopathic interrelations between plants	Interactive lecture, explanation, conversation, problem solving	2
Total number of lecture hours:		**28**

8.2. Practical activities (8.2.a. Seminar[20]/ 8.2.b. Laboratory[21]/ 8.2.c. Project[22] / 8.2.d. Other practical activities[23])	**Teaching methods**	**No. of hours**
Act.1 The plant cell as an osmotic system - osmosis - plasmolysis, turgorescence - the suction force of the cell	Practical demonstration, exercise, experiment	2
Act.2-3 Water absorption - the role of the root in absorption - the role of other plant organs in absorption	Practical demonstration, exercise, experiment	4
Act.4 The transpiration of plants and ecological factors	Practical demonstration, exercise, experiment	2
Act.5-6 Mineral nutrition of plants - the mineral content of plant tissues - artificial nutrient media	Practical demonstration, exercise, experiment	4
Act.7-9 Photosynthesis - the extraction of pigments - the synthesis of starch and other organic substances - emphasizing photosynthesis - ecological factors of photosynthesis	Practical demonstration, exercise, experiment	6
Act.10-12 Plant respiration and the influence of ecological factors	Practical demonstration, exercise, experiment	6
Act.13 Germination, growth and development of plants - ecological factors of germination and growth - highlighting the role of growth hormones	Practical demonstration, exercise, experiment	2
Act.14 The resistance of plants to polluting and stress factors	Practical demonstration, exercise, experiment	2
Total number of hours: seminar/laboratory		28

9. Bibliography

9.1. Recommended references	1. Trifu, M., Bărbat, I., 1997, *Fiziologia plantelor*, Ed. Viitorul Românesc
	2. Zamfir Alexandra, 2000, *Noţiuni de fiziologie şi ecofiziologie vegetală*, Ed. Alma Mater Sibiu
	3. Zamfir Alexandra, 1993, *Ecofiziologia plantelor*, Îndrumător de lucrări practice, Ed. Univ. "Lucian Blaga" Sibiu
9.2. Additional references	1. Atanasiu, L., 1984, *Ecofiziologia plantelor*, Ed. Şt. şi Encicl., Bucureşti

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[24]

It is carried out through periodic contacts with them in order to analyze the problem.
The choice of principles and the establishment of appropriate scientific and experimental methods for solving problems related to Biology

Choosing appropriate notions and tools from related disciplines to support the appropriate resolution of a given situation for Biology
Realization of working methodologies that allow to go through all the stages necessary for a complete investigation process (realization of measurements/calculations, data processing, interpretation).
Critical and constructive evaluation of the research approach specific to the Biology study program.

11. Evaluare

Type of activity	11.1 Assessment criteria	11.2 Assessment methods		11.3 Percentage of the final grade	Notes.[25]
11.4a Exam / Coloquium	• Theoretical and practical knowledge (quantity, correctness,accuracy)	**Midterm / ongoing assignments**[26]:	25%	75 %	
		Home assignments:	%		
		Other activities[27]:	%		
		Final assessment:	50%		
11.4b Seminar	• Frequency/relevance of contributions or answers	Proof of contributions, portfolio (scientific papers, syntheses)		%	
11.4c Laboratory	• Knowledge of equipment, methods of using specific instruments and tools; assessment of tools or achievements, processing and interpretation of results	• Written questionnaire • **Oral examination** • **Laboratory notebook, experimental work, scientific papers, etc**. • Practical demonstrations		25 %	
11.4d Project	• Quality of achieved project, accuracy of project documentation, rationale and evidence of selected solutions	• Self-assessment, project submission and/or defense • Critical assessment of a project		%	
11.5 Minimum performance standard[28] Promotion of the laboratory colloquium Fulfilling the requirements for grade 5					

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: 07 / 09 / 2025

Date of approval in the Department: 17 / 09 / 2025

	Degree, titlle, first name, surname	**Signature**
Course coordinator	Associate professor Alexandra Zamfir Ph.D Asistant lecturer Mihai-Tudor Crăciunaş Ph.D	
Study program coordinator	Associate professor Ana-Maria Benedek-Sîrbu, PhD	
Head of Department	Lecturer Ioan Tăușan, PhD	

[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] *The learning outcomes will be stated in accordance with the specific standards of the ARACIS expert commissions (https://www.aracis.ro/ghiduri/)*
[18] *Titluri de capitole și paragrafe*
[19] *Expunere, prelegere, prezentare la tablă a problematicii studiate, utilizare videoproiector, discuții cu studenții (pentru fiecare capitol, dacă este cazul)*
[20] *Discuții, dezbateri, prezentare și/sau analiză de lucrări, rezolvare de exerciții și probleme etc.*
[21] *Demonstrație practică, exercițiu, experiment etc.*
[22] *Studiu de caz, demonstrație, exercițiu, analiza erorilor etc*.
[23] *Alte tipuri de activități practice specifice*
[24] *Legătura cu alte discipline, utilitatea disciplinei pe piața muncii*
[25] *CPE – condiționează participarea la examen; nCPE – nu condiționează participarea la examen; CEF - condiționează evaluarea finală; N/A – nu se aplică*
[26] *Se va preciza numărul de teste și săptămânile în care vor fi susținute.*
[27] *Cercuri științifice, concursuri profesionale etc.*
[28] *Se particularizează la specificul disciplinei standardul minim de performanță din grila de competențe a programului de studii, dacă este cazul.*