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 (in english)

2. Details about the course

2.1. Course name	**Biophysics**			Code	FSTI.MFE.BIOEN.L.FO.2.2010.C-4.3
2.2. Course coordinator	Prof. Chicea Dan, PhD				
2.3. Practical activity coordinator	Assist. Andreea Câmpu, PhD				
2.4. Year of study[2]	I	2.5. Semester[3]	2	2.6. Type of assessment[4]	C
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	-	1	-	-	**3**
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	-	14	-	-	**42**

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	16
Preparing for the seminar / laboratorires, home assignments, reports, portfolios and essays	17
Tutoring[9]	4
Examinations[10]	4
3.3. Total number of hours for individual study [11] ***(NOSI$_{sem}$)***	**58**
3.4. Total number of hours in the curriculum (*NOAD$_{sem}$*)	**42**
3.5. Total number of hours per semester[12] **(*NOAD$_{sem}$* + *NOSI$_{sem}$*)**	**100**
3.6. No of hours / ECTS	**25**
3.7. Number of credits[13]	**4**

4. Prerequisites (if applicable)

1.1. Prerequisite courses for enrollment to this subject (from the curriculum) [14]	Introductory notions of Physics and Mathematical Analysis according to the high school curriculum and Mathematics with applications in Biology
1.2. Competencies	Computer operation and use of Microsoft Office

5. Requirements (wherever applicable)

1.3. Lecture organization and structure[15]	Room with blackboard, video projector and screen, computer for projection using the video projector, internet connection, Google Suite platform
1.4. Organization and structure of practical activities (lab/sem/pr/other) [16]	Room equipped with laboratory facilities, including appropriate electrical installations, running water, necessary laboratory equipment and computers, internet connection, Google Suite platform

6. Learning outcomes [17]

Numărul de credite alocat disciplinei: 4				
Rezultatele învățării				Credit allocation based on learning outcomes
Nr. crt.	Knowledge	Aptitudes	Responsibility and autonomy	
LO.1	The student/graduate defines, explains and exemplifies basic and modern experimental techniques in the analysis and characterizes biological systems, records and presents experimental results and explains the principles of scientific method	The student/graduate uses, investigates and critically analyzes the principles of operation and use of equipment/instruments, techniques/working methods for investigating the functioning of biological systems	The student/graduate applies knowledge learned in other courses to explain the interactions of organisms with the environment.	2
LO.2	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, ability to anticipate and prospective evaluation, courage and perseverance in achieving objectives	1
LO.3	The student/graduate accurately applies the fundamental concepts of Biology in diverse		The student/graduate demonstrates negotiation, empathy, assertive communication, leadership,	1

	contexts		teamwork, conflict management, team management, and public speaking skills.	

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

1.5. General objective	Students' knowledge of the main concepts of Biophysics, namely Thermodynamics, Molecular Phenomena in Liquids, Electricity and Magnetism, Optics, and how these fundamental concepts are applied in studying the physical properties of biological structures and the interaction between different physical factors.
1.6. Specific objectives	Acquiring practical skills in working with laboratory equipment to determine various physical properties of substances, namely temperature, electrical resistivity, specific and molar heat of certain substances, using measuring and control equipment including optical microscopes, refractometers, and digital multimeters.

8. Course description

8.1 Lecture[18]	**Teaching methods**[19]	**No. of hours**
Lecture 1 Fundamentals of differential calculus	Lecture, presentation of the studied topics on the blackboard, use of a video projector	2
Lecture 2 Introduction to Thermodynamics, postulates	Lecture, presentation of the studied topics on the blackboard, use of a video projector	2
Lecture 3 Priciples of Thermodynamics	Lecture, presentation of the studied topics on the blackboard, use of a video projector	2
Lecture 4 The Carnot theorems. Thermodynamic potentials with application to Biology	Lecture, presentation of the studied topics on the blackboard, use of a video projector	2
Lecture 5 Molecular phenomena: diffsion, osmosis	Lecture, presentation of the studied topics on the blackboard, use of a video projector	2
Lecture 6 Introduction to fluid mechanis, definitions	Lecture, presentation of the studied topics on the blackboard, use of a video projector	2
Lecture 7 Fluid statics	Lecture, presentation of the studied topics on the blackboard, use of a video projector	2
Lecture 8 Introduction to fluid dynamics, equation of continuity, particular cases	Lecture, presentation of the studied topics on the blackboard, use of a video projector	2
Lecture 9 Bernoulli's law and applications	Lecture, presentation of the studied topics on the blackboard, use of a video projector	2
Lecture 10 Viscosity, Poisseuille equation, application to biological systems	Lecture, presentation of the studied topics on the blackboard, use of a video projector	2
Lecture 11 Stokes law, motion of a body in a real fluid	Lecture, presentation of the studied topics on the blackboard, use of a video projector	2
Lecture 12 Viscous flow, similitude of flowing	Lecture, presentation of the studied topics on the blackboard, use of a video projector	2
Lecture 13 Geometrical optics, the eye	Lecture, presentation of the studied topics on the blackboard, use of a video projector	2
Lecture 14 Wave optics, applications	Lecture, presentation of the studied topics on the blackboard, use of a video projector	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 Errors, error calculations and data processing in a Biophysics experiment	Practical demonstration, experiment	2
Act.2 Newton's law	Practical demonstration, experiment	2
Act.3 Assessment of the dynamic viscosity of a fluid	Practical demonstration, experiment	2
Act.4 Measuring the supperficial tension coefficient using the drop method	Practical demonstration, experiment	2
Act.5 Study of diffusion in an loquid solvent	Practical demonstration, experiment	2
Act.6 Measuring biological grain size using an optical microscope	Practical demonstration, experiment	2
Act.7 Light scattering on biological suspensions	Practical demonstration, experiment	2
	Total number of hours: laboratory	14

9. Bibliography

9.1 Recommended references	Rob Phillips, Jane Kondev, and Julie Theriot, Physical Biology of the Cell, Garland Science, 1st edition, 2008, ISBN-10: 0815341636 ISBN-13: 978-0815341635
	http://www.physics.drexel.edu/~brigita/COURSES/BIOPHYS_2011-2012
	Biophysics Laboratory Notebook and Laboratory Reports/ MOLDOVAN, M. & NICOLAESCU, I. (2008)
	PHYSICS FOR SCIENTISTS AND ENGINEERS, Raymond A. Serway, John W. Jewett, ISBN 0534408427
	UNIVERSITY PHYSICS WITH MODERN PHYSICS, 13TH EDITION HUGH D. YOUNG, ROGER A. FREEDMAN, LEWIS FORD, ISBN-13: 978-0-321-69686-1
9.2 Additional references	http://www.freebookcentre.net/physics-books-download/Statistical-Physics-in-Biology.html
	Systems Biology, Prof. Alexander van Oudenaarden http://www.freebookcentre.net/physics-books-download/Systems-Biology.html
	Dan Chicea, Lucrări practice de Fizică şi biofizică, Editura Universităţii Lucian Blaga, Sibiu, 2012. LUCRĂRI EXPERIMENTALE DE FIZICĂ ŞI BIOFIZICĂ, Dan Chicea, Aurel Paşca, Editura Universităţii "Lucian Blaga" din Sibiu, ISBN 978-606-12-1098-5, 2015, 290 pg.

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]

In order to develop the contents and choose teaching/learning methods, the course instructors organized an annual meeting with the faculty of the Faculty of Sciences, with representatives of the

business environment in Sibiu County, as well as with other faculty in the field, tenured in other higher education institutions. The meeting aimed to identify the needs and expectations of employers in the field and coordinate with other similar programs within other higher education institutions.

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]:	35 %	80 % (minimum 5)	
		Home assignments:	5 %		
		Other activities[27]:	0 %		
		Final assessment:	40 % (min. 5)		
11.4b Seminar	• Frequency/relevance of contributions or answers	Proof of contributions, portfolio (scientific papers, syntheses)		0 % (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	• Written questionnaire • Laboratory notebook, experimental work, scientific papers, etc.		20 % (minimum 5)	
11.5 Minimum performance standard[28] -To obtain a grade of 5 in the laboratory colloquium, -To prove in the exam that he knows the fundamental concepts presented in the course in the exam topics -To know the starting point in the mathematical demonstration related to the topic and the final relationship deduced					

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: 11 / 09 / 2025

Date of approval in the Department: 17 / 09 / 2026

	Degree, titlle, first name, surname	**Signature**
Course coordinator	Prof. Dan Chicea, PhD	
Study program coordinator	Assoc. Prof. Ana-Maria Benedek-Sîrbu, PhD	
Director 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*

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.*