COURSE SYLLABUS

Academic year 2025 - 2026

1. Programme Information

1.1.	Higher education institution	**"Lucian Blaga" University of Sibiu**
1.2.	Faculty	Faculty of Sciences
1.3.	Department	Environmental Science, Physics, Physical Education and Sport
1.4.	Field of study	Biology
1.5.	Level of study[1]	Bachelor
1.6.	Program Specialization	Biology (in english)

2. Details about the course

2.1. Name of course	**Enzymology**			Code	FSTI.MFE.BIOEN.L.CA.4.1020.E-5.11		
2.2. Course coordinator	Lecturer Ioana Boeraș, PhD						
2.3. Seminar / laboratory coordinator	Research Asist. eng. Alexandra Maranciuc, PhD						
2.4. Year of study[2]	2	**2.5.** Semester[3]		4	**2.6.** Evaluation form [4]		E
2.7. Course type [5]		A	**2.8.** The formative category of the course [6]				C

3. Estimated total time

3.1. Course Extension within the Curriculum – Number of Hours per Week					
3.1.a.Lecture	3.1.b. Seminar	3.1.c. Laboratory	3.1.d. Project	3.1.e Other	Total
1		2			**3**
3.2. Course Extension within the Curriculum – Total Number of Hours within the Curriculum					
3.2.a.Lecture	3.2.b. Seminar	3.2.c. Laboratory	3.2.d. Project	3.2.e Other	Total[7]
14		28			**42**

Time Distribution for Individual Study [8]	**Hours**
Learning by using course materials, references and personal notes	32
Additional learning by using library facilities, electronic databases and on-site information	18
Preparing seminars / laboratories, homework, portfolios and essays	20
Tutorial activities [9]	9
Exams[10]	4

3.3. Total Individual Study Hours [11] ***(NOSI$_{sem}$)***	**83**
3.4. Total Hours in the Curriculum (*NOAD$_{sem}$*)	**42**
3.5. Total 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 needed)

4.1. Courses that must be successfully completed first (from the curriculum) [14]	
4.2. Competencies	

5. Conditions (wherever applicable)

5.1. For course/lectures [15]	Blackboard, video projector, specific teaching materials, online platforms, etc.
5.2. For practical activities (lab/sem/pr/other) [16]	Compliance with labor protection rules and conduct in a chemical laboratory. Use of specific equipment (robe/gloves). Chemical regaents, laboratory, pipetes, tubes, specific apparatus for chemical determinations, kits. Presence is mandatory. Participation in all laboratory work - is a condition for participation in the laboratory exam.

6. Learning outcomes [17]

Number of credits assigned to the discipline: 5				
Learning outcomes				Credit allocation based on learning outcomes
No.	Knowledge	Aptitudes	Responsibility and autonomy	
LO 1	The student/ graduate student describes, defines and discusses fundamental principles in Enzymology as well as interdisciplinary aspects.	The student/graduate student applies working methods using modern instruments/equipment and classical laboratory techniques to carry out, design experiments, record and properly analyze the results obtained.	The student/ graduate student uses his/her own knowledge and experience to contribute to the development of the scientific community and society in general by participating in professional and/or community activities.	1
LO 2	The student/ graduate student correctly uses and explains the specific terminology used in the field of En enzymology, the main concepts and their relationships, the characteristics of enzymes from the perspective of biological processes.	The student/ graduate student defines, describes, discusses/presents major concepts in the field of Biology (Enzymology).	The student/ graduate student demonstrates responsibility and autonomy in the use of scientific knowledge in the field of Enzymology, by conducting research, developing or improving concepts, theories, operational methods or biotechnological products, assuming ethical and professional decisions within the scientific process.	2
LO 3	The student/ graduate student analyzes, evaluates and uses concepts, theories and methods from other fields in the field of Enzymology.	The student/ graduate student achieves transdisciplinary integration of knowledge in order to assess the supportability of biological systems.	The student/ graduate student shows initiative and self-control, anticipation and prospective evaluation, courage and perseverance in achieving objectives.	2

7. Course objectives (resulted from developed competencies)

7.1. Main course objective	Learning the basic concepts related to enzymology, nomenclature, the structure of enzymes, their kinetics, their mechanisms in metabolic processes and in applications for the pharmaceutical, cosmetic, food and biomedical industries.
7.2. Specific course objectives	O1. To recognize the class to which the studied enzymes belong. O2. To understand the action mechanisms of enzymes and the factors that influence enzyme activity. O3. To correlate laboratory activities with the practical applicability of enzymes in various fields of industrial activity or fundamental research.

8. Course description

8.1. Lecture[18]		**Teaching methods** [19]	**Hours**
Lecture 1	Introduction to enzymology	Presentation using multimedia means, powerpoint presentations, lecture, debate, exemplification, dialogue	2
Lecture 2	Enzymes: nomenclature, structure, cofactors, specificity, properties, examples	Presentation using multimedia means, powerpoint presentations, lecture, debate, exemplification, dialogue	2
Lecture 3	Classification, examples. Mechanism of enzymes	Presentation using multimedia means, powerpoint presentations, lecture, debate, exemplification	2
Lecture 4	Enzymes in biology, medicine and molecular biology	Presentation using multimedia means, powerpoint presentations, lecture, debate, exemplification, dialogue	2
Lecture 5	Methods for investigating enzymes	Interactive presentation of the material according to the analytical program, using multimedia tools, powerpoint presentations, didactic films. Debate. Discussions.	2
Lecture 6	Vitamins: General properties, classification, examples, applications	Interactive presentation of the material according to the analytical program, using multimedia tools, powerpoint presentations, didactic films. Debate. Discussions.	2
Lecture 7	Practical use of enzymes in the medical and research fields. Therapies used in enzymology	Interactive presentation of the material according to the analytical program, using multimedia tools, powerpoint presentations, didactic films. Debate. Discussions.	2
		Total lecture hours:	**14**

8.2. Practical activities

8.2.b. Laboratory		**Teaching methods** [20]	**Hours**
Laboratory 1	Labor protection norms. Equipment and apparatus. Organizing the seminar and assigning the report topics (presentation).	Demonstration, dialogue	2
Laboratory 2	Concentrations calculations, solutions determinations	Demonstration, explanation, dialogue, practical work	4
Laboratory 3	Catalase activity determination	Individual study of the related didactic material, individual or demonstrative experiment, dialogue, practical work	4

Laboratory 4	Determination of the influence of temperature on salivary amylase activity	Individual study of the related didactic material, individual or demonstrative experiment, dialogue, practical work	4
Laboratory 5	Determining the specificity of enzymes	Individual study of the related didactic material, individual or demonstrative experiment, dialogue, practical work	4
Laboratory 6	The effect of ascorbic acid on salivary amylase	Individual study of the related didactic material, individual or demonstrative experiment, dialogue, practical work	4
Laboratory 7	Power-point presentation – presentation of a topic of interest within the discipline	Individual study of the related didactic material, individual or demonstrative experiment, dialogue, practical work	4
Laboratory 8	Laboratory practical examination	Evaluation	2
		Total laboratory hours	28

9. Bibliography

9.1. Recommended references	Anton Ciucu. Biochimie analitică. Editura Universității din București, 2007
	Francesca Magnani, Chiara Marabelli, Francesca Paradisi. Enzyme Engineering Methods and Protocols: Methods and Protocols, 2022
	Ashok Mulchandani, Kim R. Rogers. Enzyme and Microbial Biosensors: techniques and protocols, Humana Press,1998
	Constantin Cheptănaru. Chimie organică. Universitatea de Stat de Medicină şi Farmacie „Nicolae Testemiţanu", 2019
	Trevor Palmer, Philip L. Bonner. Enzymes: Biochemistry, Biotechnology and Clinical Chemistry. WOODHEAD PUBLISHING. 2007
9.2. Additional references	Databases: WoS, Scopus - in order to idetify the latest recent research studies (2020-2025) in the field of Enzymology: presentation of study results, interpretation of results

10. Conjunction of the discipline's content with the expectations of the epistemic community, professional associations and significant employers of the specific study program [21]

The course has a content based on student preparation, being similar to courses in other European universities.
The course is fundamental for the development of work skills in research laboratories and/or in biotechnological systems engineering applications.

11. Evaluation

Activity Type	11.1 Evaluation Criteria	11.2 Evaluation Methods		11.3 Percentage in the Final Grade	Notes.[22]
11.4a Exam / Coloquium	• Theoretical and practical knowledge acquired (quantity, correctness, accuracy)	Tests during the semester [23]:	%	60 % (minimum 5)	CPE
		Homework:	%		
		Other activities[24]:	%		
		Final evaluation: Exam with grid and essay type questions.	60 % (min. 5)		
11.4c Laboratory	• Knowledge of the equipment, how to use specific tools; evaluation of tools, processing and interpretation of results	Test Laboratory notebook, experimental works, reports, etc. Practical demonstration		40 % (minimum 5)	CEF

11.5 Minimum performance standard[25] **Achieving 50% of the total constituent weights of the final grade, provided that each test/exam is completed in proportion to 50% (Minimum Grade 5).**	

The Course Syllabus will encompass components adapted to persons with special educational needs (SEN – people with disabilities and people with high potential), depending on their type and degree, at the level of all curricular elements (skills, objectives, contents, teaching methods, alternative assessment), in order to ensure fair opportunities in the academic training of all students, paying close attention to individual learning needs.

Filling Date: |_1_|_5_| / |_0_|_9_| / |_2_|_0_|_2_|_5_|

Department Acceptance Date: |_1_|_7_| / |_0_|_9_| / |_2_|_0_|_2_|_5_|

	Academic Rank, Title, First Name, Last Name	**Signature**
Course Teacher	Lecturer Ioana Boeraș, PhD	
Study Program Coordinator	Assoc. Prof. Ana-Maria Benedek-Sîrbu, PhD	
Head of Department	Lecturer Ioan Tăușan, PhD	

[1] *Bachelor / Master*
[2] *1-4 for bachelor, 1-2 for master*
[3] *1-8 for bachelor, 1-4 for master*
[4] *Exam, colloquium or VP A/R - from the curriculum*
[5] *Course type: R = Compulsory course; E = Elective course; O = Optional course*
[6] *Formative category: S = Specialty; F = Fundamental; C = Complementary; I = Fully assisted; P = Partially assisted; N = Unassisted*
[7] *Equal to 14 weeks x number of hours from point 3.1 (similar to 3.2.a.b.c.)*
[8] *The following lines refer to individual study; the total is completed at point 3.7.*
[9] *Between 7 and 14 hours*
[10] *Between 2 and 6 hours*
[11] *The sum of the values from the previous lines, which refer to individual study.*
[12] *The sum (3.5.) between the number of hours of direct teaching activity (NOAD) and the number of hours of individual study (NOSI) must be equal to the number of credits assigned to the discipline (point 3.7) x no. hours per credit (3.6.)*
[13] *The credit number is computed according to the following formula, being rounded to whole neighbouring values (either by subtraction or addition*

$$No.credits = \frac{NOCpSpD \times C_C + NOApSpD \times C_A}{TOCpSdP \times C_C + TOApSdP \times C_A} \times 30\ credits$$

Where:

- NOCpSpD = Number of lecture hours / week / discipline for which the credits are calculated
- NOApSpD = Number of application hours (sem./lab./pro.) / week / discipline for which the credits are calculated
- TOCpSdP = Total number of course hours / week in the Curriculum
- TOApSdP = Total number of application hours (sem./lab./pro.) / week in the Curriculum
- C_C/C_A = Course coefficients / applications calculated according to the table

Coefficients	**Course**	**Applications (S/L/P)**
Bachelor	2	1
Master	2,5	1,5
Bachelor - foreign language	2,5	1,25

[14] *The courses that should have been previously completed or equivalent will be mentioned*
[15] *Board, video projector, flipchart, specific teaching materials, online platforms, etc.*
[16] *Computing technology, software packages, experimental stands, online platforms, 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] *Chapter and paragraph titles*
[19] *Exposition, lecture, board presentation of the studied topic, use of video projector, discussions with students (for each chapter, if applicable)*
[20] *Practical demonstration, exercise, experiment*
[21] *The relationship with other disciplines, the usefulness of the discipline on the labour market*
[22] *CPE – Conditions Exam Participation; nCPE – Does Not Condition Exam Participation; CEF - Conditions Final Evaluation; N/A – not applicable*
[23] *The number of tests and the weeks in which they will be taken will be specified*
[24] *Scientific circles, professional competitions, etc.*
[25] *The minimum performance standard in the competence grid of the study program is customized to the specifics of the discipline, if applicable*