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 Sciences, Physics, Physical Education and Sports
1.4. Field of study	Biology
1.5. Level of study [i]	Bachelor
1.6. Programme of study	Biology (in english)

2. Details about the course

2.1. Name of course	**Laboratory techniques**			Code	FSTI.MFE.BIOEN.L.SA.3.1100.C-5.7
2.2. Course coordinator	Assoc. Prof. Ioan Sîrbu, PhD				
2.3. Seminar / laboratory coordinator	Assist. Ion Brînza, PhD[1]				
2.4. Year of study[ii]	2	**2.5.** Semester[iii]	3	**2.6.** Evaluation form [iv]	C
2.7. Course type [v]	A	**2.8.** The formative category of the course [vi]			S

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	1				**2**
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[vii]
14	14				**28**

Time Distribution for Individual Study [viii]	**Hours**
Learning by using course materials, references and personal notes	25
Additional learning by using library facilities, electronic databases and on-site information	25
Preparing seminars / laboratories, homework, portfolios and essays	25
Tutorial activities [ix]	22
Exams[x]	4
3.3. Total Individual Study Hours [xi] ***(NOSI$_{sem}$)***	**97**
3.4. Total Hours in the Curriculum (*NOAD$_{sem}$*)	**28**
3.5. Total Hours per Semester [xii] **(*NOAD$_{sem}$* + *NOSI$_{sem}$*)**	**125**
3.6. No. of hours / ECTS	**25**
3.7. Number of credits[xiii]	**5**

[1]

4. Prerequisites (if needed)

4.1. Courses that must be successfully completed first (from the curriculum) [xiv]	Cell Biology; Biochemistry
4.2. Competencies	Basic laboratory safety; teamwork; basic PC use (spreadsheets).

5. Conditions (wherever applicable)

5.1. For course/lectures [xv]	Room with video projector/computer; access to e-learning platforms (Classroom/Moodle/Teams).
5.2. For practical activities (lab/sem/pr/other) [xvi]	Balance, micropipettes, centrifuges, pH meter, spectrophotometer, electrophoresis equipment (agarose/SDS-PAGE), Western blot transfer system, protein assay kits (Bradford/BCA), ELISA kit (or datasets), PCs with ImageJ/Fiji; EHS: PPE, fume hood, emergency kit, access to e-learning platforms.

6. Learning outcomes [xvii]

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 describes, defines, and discusses fundamental principles in Biology, as well as interdisciplinary aspects (e.g., Evolution, General Ecology, Plant Physiology, Animal Physiology).	Applies working methods using modern instruments/equipment and classical laboratory techniques to carry out/design experiments, record, and correctly analyse results.	Contributes to the scientific community and society through participation in professional and/or community activities.	1
LO 2	Correctly uses and explains Biology-specific terminology, the main concepts and laws, and the characteristics of biological systems in terms of the organisation and functioning of living matter.	Defines/describes/discusses major concepts in Biology.	Demonstrates responsibility and autonomy in using scientific knowledge, making ethical and professional decisions in the scientific process.	1
LO 3	Defines, explains, and exemplifies basic and modern experimental techniques for the analysis and	Uses, investigates, and critically analyses the operating principles and use of equipment/instruments and working methods.	Applies knowledge learned in other courses to explain organism–environment interactions.	1

	characterisation of biological systems; records and presents results and explains the principles of scientific methods.			
LO 4	Demonstrates the ability to operate with appropriate methods of information/documentation/knowledge and to instruct pupils/peers/students in a scientific manner.	–	–	1
LO 5	The student/graduate describes, defines, and discusses fundamental principles in Biology, as well as interdisciplinary aspects (e.g., Evolution, General Ecology, Plant Physiology, Animal Physiology).	Applies working methods using modern instruments/equipment and classical laboratory techniques to carry out/design experiments, record, and correctly analyse results.	Contributes to the scientific community and society through participation in professional and/or community activities.	1

7. Course objectives (resulted from developed competencies)

7.1. Main course objective	To build a theoretical and practical foundation for safe use of laboratory instrumentation and application of standard laboratory techniques (separation, quantification, detection, image analysis), with emphasis on data quality and proper reporting.
7.2. Specific course objectives	by the end of the course, the student will be able to: • O1) comply with EHS/BSL and use laboratory instruments correctly; • O2) select and apply separation techniques (chromatography, electrophoresis); • O3) perform quantitative determinations (protein assays; ELISA; spectrophotometry); • O4) interpret results (curves, bands, immunological signal), calculate errors/LOD/LOQ; • O5) document and communicate results (tables, graphs, short report) and use ImageJ/Fiji for quantification

8. Course description

8.1. Lecture[xviii]	**Teaching methods** [xix]	**Hours**

Lecture 1	Laboratory safety. Instrumentation & basic techniques	Interactive lecture; demonstration; problem-solving; guided discussion; mini-quiz; e-learning	2
Lecture 2	Chromatography: principles, types, parameters, applications	Lecture with examples; dataset-based demo; case study; worksheets	2
Lecture 3	Spectrophotometry	Lecture; demonstration; applied problems	2
Lecture 4	Protein concentration determination (Bradford/BCA/A280)	Lecture; demonstration; case study on controls; guided discussion	2
Lecture 5	Electrophoresis (agarose / SDS-PAGE): principles, migration, interpretation	Lecture; demonstration; guided exercises; mini-quiz	2
Lecture 6	Immunological detection of proteins – Western blot	Lecture; demonstration;	2
Lecture 7	ELISA: principles, formats, and interpretation	Lecture; guided exercises; applied discussion	2
		Total lecture hours:	**14**

8.2. Practical activities

8.2.a. Seminar		**Teaching methods** [xx]	**Hours**
Seminar 1	EHS & basic techniques. Protective equipment and devices	Guided demonstration; problem-solving; practical exercise	**2**
Seminar 2	Chromatography (TLC / HPLC — concept)	Demonstration; group exercises; case study	**2**
Seminar 3	Protein concentration determination (e.g., Bradford; alternatively BCA / A280)	Short lecture (Beer–Lambert principle); demonstration (calibration curve, λ); group exercise (replicates, calculation). Curve calculator/spreadsheet; training data set	**2**
Seminar 4	Determining enzymatic activity using spectrophotometric techniques	Hands-on exercise; spectrophotometry	**2**
Seminar 5	Electrophoresis (agarose / SDS-PAGE)	Demonstration; sample loading; band interpretation. Electrophoresis simulator; image set	**2**
Seminar 6	Western blot (transfer + detection)	Demonstration; guided steps; discussion of controls. Western blot simulator; image set. Blot image set;	**2**
Seminar 7	ELISA	Short presentation; data work; interpretation	**2**
		Total laboratory hours	14

9. Bibliography

9.1. Recommended references	Bonner, P. L. R.; Hargreaves, A. J. (2022). *Basic Bioscience Laboratory Techniques: A Pocket Guide* (2nd ed.). Chichester, West Sussex: Wiley-Blackwell. ISBN 1119663350, 978-1119663355.
	Mihășan, M.; Ștefan, M.; Olteanu, Z. (2012). *Biologie moleculară – metode experimentale*. Iași: Editura Universității „Alexandru Ioan Cuza".
	Estridge, B. H.; Reynolds, A. P. (2011). *Basic Clinical Laboratory Techniques* (6th ed.). Delmar Cengage Learning. ISBN-13: 978-1111138363 (print); eTextbook: 978-1285225593.
	Sood, Ramnik. *Medical Laboratory Technology: Methods and Interpretations* (7th ed., 2024). New Delhi: Jaypee Brothers Medical Publishers. ISBN 9789354652493.
9.2. Additional references	Meah, M.; Kebede-Westhead, E. (2012). *Essential Laboratory Skills for Biosciences*. Chichester, West Sussex: John Wiley & Sons. ISBN 978-0470686478 (print), 978-1119966760 (eBook).

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

The contents of Laboratory Techniques are updated periodically in dialogue with academics, researchers, and employers (clinical/industrial labs, environmental labs, biotech) to reflect current practice requirements

- Mechanisms for correlation and continuous improvement:
- annual consultations with professional partners and alumni (surveys/tracer study);
- revision of topics and practicals based on internship/practice feedback;
- integration of digital resources (simulators, image analysis) recommended by partners for pre-lab preparation;
- internal quality checks.

11. Evaluation

Activity Type	11.1 Evaluation Criteria	11.2 Evaluation Methods		11.3 Percentage in the Final Grade	Notes. [xxii]
11.4a Exam / Coloquium	• Theoretical and practical knowledge acquired (quantity, correctness, accuracy)	Tests during the semester [xxiii]:	%	60 % (minimum 5)	
		Homework:	%		
		Other activities[xxiv]:	%		
		Final evaluation:	% (min. 5)		
11.4b Seminar	• Frequency/relevance of participation or responses	Evidence of participation, portfolio of papers (reports, scientific summaries)		% (minimum 5)	
11.4c Laboratory	• Knowledge of the equipment, how to use specific tools; evaluation of tools, processing and interpretation of results	• Oral response • Written questionnaire • Laboratory notebook, experimental works, reports, etc. • Practical demonstration		40 % (minimum 5)	
11.4d Project	• The quality of the project, the correctness of the project documentation, the appropriate	• Self-evaluation, project presentation • Critical evaluation of a project		% (minimum 5)	

	justification of the chosen solutions			
11.5 Minimum performance standard[xxv] Knowledge of the basic notions in the field, the ability to explain the operating principles of the presented techniques, the ability to perform an experiment according to the standards.				

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: |_11_| / |_09_| / |_2025_|

Department Acceptance Date: |_17_| / |_09_| / |_2025_|

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

[i] *Bachelor / Master*

[ii] *1-4 for bachelor, 1-2 for master*

[iii] *1-8 for bachelor, 1-4 for master*

[iv] *Exam, colloquium or VP A/R - from the curriculum*

[v] *Course type: R = Compulsory course; E = Elective course; O = Optional course*

[vi] *Formative category: S = Specialty; F = Fundamental; C = Complementary; I = Fully assisted; P = Partially assisted; N = Unassisted*

[vii] *Equal to 14 weeks x number of hours from point 3.1 (similar to 3.2.a.b.c.)*

[viii] *The following lines refer to individual study; the total is completed at point 3.7.*

[ix] *Between 7 and 14 hours*

[x] *Between 2 and 6 hours*

[xi] *The sum of the values from the previous lines, which refer to individual study.*

[xii] *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.)*

[xiii] *The credit number is computed according to the following formula, being rounded to whole neighbouring values (either by subtraction or addition*

$$\text{No.credits} = \text{NOCpSpD} \times \text{CC} + \text{NOApSpD} \times \text{CATOCpSdP} \times \text{CC} + \text{TOApSdP} \times \text{CA} \times 30 \text{ credits}$$

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

[xiv] *The courses that should have been previously completed or equivalent will be mentioned*

[xv] *Board, video projector, flipchart, specific teaching materials, online platforms, etc.*

[xvi] *Computing technology, software packages, experimental stands, online platforms, etc.*

[xvii] *The learning outcomes will be stated in accordance with the specific standards of the ARACIS expert commissions (https://www.aracis.ro/ghiduri/)*

[xviii] *Chapter and paragraph titles*

[xix] *Exposition, lecture, board presentation of the studied topic, use of video projector, discussions with students (for each chapter, if applicable)*

[xx] *Practical demonstration, exercise, experiment*

[xxi] *The relationship with other disciplines, the usefulness of the discipline on the labour market*

[xxii] *CPE – Conditions Exam Participation; nCPE – Does Not Condition Exam Participation; CEF - Conditions Final Evaluation; N/A – not applicable*

[xxiii] *The number of tests and the weeks in which they will be taken will be specified*

[xxiv] *Scientific circles, professional competitions, etc.*

[xxv] *The minimum performance standard in the competence grid of the study program is customized to the specifics of the discipline, if applicable*