



SUBJECT OUTLINE

1. Information on the programme

1.1. Higher education institution	“Ion Ionescu de la Brad” Iasi University of Life Sciences
1.2. Faculty	Veterinary Medicine
1.3. Department	IX – Preclinics
1.4. Field of study	Veterinary Medicine
1.5. Cycle of study ¹	Bachelor and Master (unitary study programme)
1.6. Specialization/ Study programme	Veterinary Medicine
1.7. Form of education	Full time

2. Information on the discipline

2.1. Name of the discipline	Molecular biology							
2.2. Course coordinator	Lecturer Aniță Dragoș Constantin, DVM, PhD							
2.3. Seminar/ laboratory/ project coordinator	Lecturer Aniță Dragoș Constantin, DVM, PhD							
2.4. Year of study	II nd	2.5. Semester	III rd	2.6. Type of evaluation	Summative	2.7. Discipline status	Content ²	FD
							Compulsoriness ³	CD

3. Total estimated time (teaching hours per semester)

3.1. Hours per week – full time programme	3	out of which: 3.2. lecture	2	3.3. seminar/ laboratory/ project	1
3.4. Total number of hours in the curriculum	42	Out of which: 3.5. lecture	28	3.6. seminar/laboratory	14
Distribution of the time allotted					hours
3.4.1. Study based on book, textbook, bibliography and notes					25
3.4.2. Additional documentation in the library, specialized electronic platforms and field					10
3.4.3. Preparing seminars/ laboratories/ projects, subjects, reports, portfolios and essays					10
3.4.4. Tutorials					2
3.4.5. Examinations					3
3.4.6. Other activities					
3.7. Total hours of individual study	25				
3.8. Total hours per semester	81				
3.9. Number of credits ⁴	4				

4. Prerequisites (is applicable)

4.1. curriculum-related	Cellular Biology, Genetics, Biochemistry, Physics
4.2. skills-related	The student must have knowledge regarding the basic concepts of cellular biology, biochemistry and physics.

5. Conditions (if applicable)

5.1. for the lecture	The course is interactive; students can ask questions regarding the content of the presentation. Students will not be present at lectures with open mobile phones. There will be no tolerance for students' delay in the course.
5.2. for the seminar/ laboratory/ project	At practical work is required to study the laboratory materials in advance; each student will participate to and conduct the laboratory activities using the provided materials and only under teacher supervision. Laboratory meeting begins with a seminar having as topics the material taught in the previous courses and laboratories. Students will not be present at practical works with open mobile phones. There will be no tolerance for students' delay in the practical work.

6. Specific competences acquired

Professional competences	<ul style="list-style-type: none"> - An understanding of the background facts and concepts of molecular biology, alongside with knowledge of terminology and language specific to the subject. - An understanding of the potential applications of molecular biology to veterinary medicine. Knowledge of the structure and function of nucleic acids in the mechanisms involved in the main cellular processes; - Knowledge and performing of the DNA, RNA molecular laboratory techniques (DNA, RNA extraction, PCR, electrophoresis) and specific techniques for protein analysis (protein extraction, electrophoresis) used in veterinary medicine; - Knowledge and use of the laboratory and computer- based tools that can be used to study gene and genome identity and function (“molecular tools”); -Performing the interpretation of the results of the molecular techniques and their correlation with clinical cases.
Transversal competences	<p>An understanding of the wider implications of employing molecular-based technologies in veterinary medicine and to society. Teamwork, oral and written communication skills in English, use of information and communication technology - ICT, problem solving and decision making, recognition and respect for diversity and multiculturalism, learning autonomy, entrepreneurship initiative and spirit, openness to learning and documentation continue, respect and develop the values of professional ethics and deontology.</p> <p>Documentation in English and at least in an international language for the identification of new knowledge in the field, with the aim of professional and personal development.</p> <p>Responsible execution of all tasks, design and presentation of complex projects in the field of veterinary medicine. To participate in scientific and professional development projects, compatible with the requirements of integration into the European market.</p>

7. Course objectives (based on the list of competences acquired)

7.1. Overall course objective	Accumulation of general notions of molecular biology, emphasizing the importance of molecular biology investigation in the diagnosis, the emergence and reemergence of infectious and parasitic diseases, ways of prevention.
7.2. Specific objectives	<ul style="list-style-type: none"> • Learning specific techniques DNA, RNA (DNA, RNA extraction, electrophoresis, PCR) • Participation in specific techniques of protein (protein extraction, electrophoresis) used in veterinary medicine. • Laboratory and computer- based tools that can be used to study gene and genome identity and function (“molecular tools”), • To introduce students in performing and interpreting laboratory results and their correlation with clinical cases

8. Content semester I

8.1. LECTURE Number of hours – 28	Teaching methods	Notes
<ol style="list-style-type: none"> 1. Introduction. Organization of cells and cellular compartments. The various definitions and history of the gene. The discovery of DNA. 2. DNA: the support of hereditary information. Structure of DNA. Topology of DNA. 3. Molecular mechanism of DNA replication 4. RNA : Transcription, Types/Structures, RNA Polymerases. 5. Protein structure and function 6. Genes and the genetic code 7. Techniques of Molecular Biology - Nucleic Acids: Isolation, Purification, Detection, and Hybridization. 8. Recombinant DNA Technology. 9. Techniques of Molecular Biology - Fundamentals of the Polymerase Chain Reaction. 10. Specific types of Polymerase Chain Reaction 11. DNA Sequencing—General Principle 12. Bioinformatics and Computer Analysis. Tools 	Lecture	A two-hour lecture weekly

13. Bioinformatics and Computer Analysis. Analysis and interpretations		
14. Proteomics: The Global Analysis of Proteins.		

8.2. PRACTICAL WORK Number of hours – 14 1. The molecular biology laboratory-The laboratory set-up. 2. Performance of assay- Sample preparation 3. Performance of assay - DNA and RNA extraction 4. Classical PCR and Real Time PCR set-up 5. Agarose gel electrophoresis, Electrophoretic conditions, Visualising the DNA 6. Interpretation of PCR results, General PCR problems. Theoretical examination. 7. Bioinformatics- Principles of bioinformatics and sequence analysis	Theoretical presentation of the practical work, followed by interactive discussions based on the approached theme. Execution of the practical work - laboratory technics, applications and computer problems	A 2-hour session once every two weeks
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COMPULSORY BIBLIOGRAPHY:

1. Electronic course and practical work support – PPT presentations
2. Aniță Dragoș Constantin. *Molecular biology*, 2020, Ion Ionescu de la Brad Ed. Iași, ISBN 978-973-147-361-1

OPTIONAL BIBLIOGRAPHY:

1. *Molecular Diagnostic PCR Handbook* 2005, Authors: Gerrit J. Viljoen, Louis H. Nel, John R. Crowther
2. *Molecular Biology of the Gene*, 7th Edition 2014, Authors: James D. Watson, Tania A. Baker, Stephen P. Bell, Alexander Gann, Michael Levine, Richard Losick

9. Corroborating the course content with the expectations of the epistemic community representatives, of the professional associations and of the relevant employers in the corresponding field

In order to improve the content, the choice of methods of teaching / learning, the coordinator of the discipline participated in meetings with: members of the General Association of Veterinarians of Romania, the College of Veterinarians of Romania, European training programs (POSDRU), as well as with other specialist in the field, from other higher education institutions in the country and the European Union (Erasmus mobility). The meetings aimed at identifying the needs and expectations of employers in the field and corroborating with other similar programs within the other higher education institutions in Europe, the profession of veterinary surgeon being regulated by specific European regulations.

10. Assessment

Type of activity	10.1. Assessment criteria	10.2. Assessment methods	10.3. Percentage of the final grade
10.4. Lecture	Knowledge and use terms specific to molecular biology, and specific methods and technics in molecular biology laboratory	MCQ test	60 %
		Attendance	20%
10.5. Seminar/Laboratory	Laboratory work assessment must highlight the assimilation degree (theoretical and practical) obtained by the student. Application and specific methods and techniques in molecular biology laboratory.	The laboratory assessment is organized in one theoretical examination.	20 %

10.6. Minimum performance standards

Knowledge of the key elements of molecular biology laboratory conduct. Recognize and correctly use the basic equipment from a molecular biology laboratory. Knowledge and application of specific methods and techniques in molecular biology laboratory (DNA, RNA extraction, PCR, electrophoresis).

¹ Cycle of studies- choose of the three options: Bachelor/Master/Ph.D.

² Discipline status (content)- for the undergraduate level, choose one of the options:- **FD** (fundamental discipline), **BD** (basic discipline), **CS** (specific disciplines-clinical sciences), **AP** (specific disciplines-animal production), **FH** (specific disciplines-food hygiene), **UO** (disciplines based on the university's options).

³ Discipline status (compulsoriness)- choose one of the options – **CD** (compulsory discipline) **OD** (optional discipline) **ED** (elective discipline).

⁴ One credit is equivalent to 25-30 hours of study (teaching activities and individual study).

Date
14.09.2021

Course coordinator
Lecturer Anița Dragos Constantin DVM PhD

Laboratory work/seminar coordinator
Lecturer Anița Dragos Constantin DVM PhD

Head of the Department
Assoc. Prof. Geta Pavel DVM PhD

Date
17.09.2021

Approved by the Faculty Council