



UNIVERSIDADE DE LISBOA
Faculdade de Medicina Veterinária

Biochemistry, Cellular and Molecular Biology

Curricular Year: 1st

Duration: 1st Semester

Credits: 10 ECTS

Teachers: José Prates (CCP e R); Ana Amaral; Mário Pinho; Mário Quaresma; Pedro Bule; Victor Alves.

Contact Hours: 125H Total.

56H Lectures; 46H Practical and laboratory teaching; 14H Seminar; 1H Tutorial orientation.

Learning objectives:

General objectives: to provide students with an understanding of the fundamental concepts and principles governing the chemical composition and functioning of cells, emphasizing their importance within Veterinary Sciences, while also fostering the development of skills in applying the scientific method.

Specific objectives: to enable students to apply their knowledge and competencies critically in the areas of biomolecules and cellular biology, including the structure, properties and functions of biomolecules (including enzymes); the bioenergetics and principal metabolic pathways and their integration into animal metabolism; cellular organization, genomics, proteomics, nucleic acid and protein metabolism, regulation of gene expression, vesicular trafficking and control of the cell cycle; essential laboratory methodologies; analytical techniques for cells and genes; and the biophysical aspects relevant to Veterinary Sciences.

Program contents:

Theoretical: Structure, properties, and functions of water, proteins, enzymes and enzyme kinetics, carbohydrates, lipids, and nucleic acids. Glycolysis and hexose catabolism. Citric acid cycle. Oxidation of fatty acids, amino acids, and the urea cycle. Oxidative phosphorylation. Biosynthesis of carbohydrates, lipids, amino acids, and nucleotides. Organ-specific metabolism. Integration and hormonal regulation of metabolism. Recombinant DNA technology. Genes and chromosomes. DNA, RNA, and protein metabolism. Regulation of gene expression. Genomics and proteomics. Cellular signaling pathways. Vesicular trafficking. Cell cycle and its regulation. Practical: Microscopy techniques. Basic laboratory techniques. Spectrophotometric techniques. Chromatographic techniques. Protein analysis techniques. Enzyme analysis techniques. Nucleic acid analysis techniques. Recombinant DNA technology. Information retrieval from biological databases.

Bibliography:

- PRATES, J. A. M. (2025) - Supporting Text for the Theoretical Lectures of the Biochemistry, Cell and Molecular Biology Course. 2025/26 Edition. Lisbon: Faculty of Veterinary Medicine, University of Lisbon. Materials provided to the students of the Course.
- PRATES, J. A. M. (2025) - Summaries and Technical Protocols for the Practical Sessions of the Biochemistry, Cell and Molecular Biology Course. 2025/26 Edition. Lisbon: Faculty of Veterinary Medicine, University of Lisbon. Materials provided to the students of the Course.



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- NELSON, D. L. e COX, M. M. (2021) - Lehninger Principles of Biochemistry. 8th edition. New York: W. H. Freeman and Company. ISBN 071677108X.
- ALBERTS, B. et al. (2018) - Essential Cell Biology. 5th edition. New York: Garland Science. ISBN 0815334818.

Assessment:

The theoretical component will be assessed through a final written examination (60% of the final grade) with quick-response questions (short answer, multiple-choice, true or false, fill-in-the-blank texts, and essay questions).

The practical component (40% of the final grade) will be assessed in the final written exam (20% of the final grade) and in a written report with an oral presentation, to evaluate the results of the practical work carried out in groups of 4 or 5 students (20% of the final grade).

Students' assessments are also important for measuring the effectiveness of the teaching and learning methodologies used in compliance with the unit's objectives and for making future adjustments to the teaching methodologies and the assessment of knowledge and skills.

The unit's final grade (FG) will be obtained using the formula:

$FG = 0.6 \text{ theoretical in written exam} + 0.2 \text{ practical in written exam} + 0.2 \text{ group work presented orally.}$