

Biochemistry I

Code: 100877
ECTS Credits: 6

2025/2026

Degree	Type	Year
Biochemistry	FB	1

Contact

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Teachers

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Teaching groups languages

You can view this information at the [end](#) of this document.

Prerequisites

There are no prerequisites.

Objectives and Contextualisation

The course Biochemistry I constitutes the first part of the subject "Biochemistry." It covers the structural and functional characteristics of biomolecules from a basic perspective (as appropriate for a first-year course), but also with the necessary depth required by the fact that the knowledge acquired here will be used in the second part of the subject, called Biochemistry II, and is also fundamental for following most of the courses in the Biochemistry degree.

Learning Outcomes

1. CM08 (Competence) Understand the contribution of women to the study of biomolecular structure, catalytic mechanisms and metabolism.
2. CM09 (Competence) Explain how study of the structure and function of biomolecules contributes to the Sustainable Development Goals.
3. KM14 (Knowledge) Define the structure, reactivity and function of biomolecules and their basic units.
4. KM15 (Knowledge) Describe the molecular mechanisms involved in catalysis, enzyme inhibition, signal transduction, substance transport, and metabolism.
5. KM16 (Knowledge) Describe the experimental techniques used in the study of the structure, function and metabolism of biomolecules.

6. SM10 (Skill) Interpret the kinetic and thermodynamic parameters of enzymatic reactions and that govern ligand binding to biomolecules.
7. SM11 (Skill) Select the most appropriate experimental techniques to study the structure, function and metabolism of biomolecules.
8. SM12 (Skill) Identify the legal and ethical aspects of the use of different types of samples in biochemistry experiments.

Content

SYLLABUS:

Topic 1. ELEMENTS, MOLECULES AND PHYSICAL ENVIRONMENT.

Levels of structural organization of biomolecules. Types of bonds in molecules. The biological importance of water. Non-covalent interactions. Ionization of water. Acid-base. Ion balance and buffering systems.

Topic 2. PRINCIPLES OF BIOENERGETICS.

The transformations of energy to living organisms and thermodynamics. Free energy and equilibrium constant. Coupled reactions. Transfer of phosphate groups, and ATP paper. Oxidation reactions.

Topic 3. PROTEINS 1: PRIMARY STRUCTURE AND BIOLOGICAL FUNCTIONS.

Protein classes and their functions. Structure and properties of amino acids. Stereoisomers. Peptides and the peptide group. Analysis of the composition of amino acids and the sequence of proteins.

Topic 4. PROTEINS 2: THREE-DIMENSIONAL STRUCTURE OF PROTEINS.

Structuring levels of proteins. Secondary structure. Fibrous proteins. Macromolecular self-assembly of proteins. Globular proteins Protein folding: factors that determine it. Molecular Chaperones. Introduction to conformational diseases. Prediction of the protein structure. Quaternary structure. Determination of the three-dimensional structure of macromolecules by means of nuclear magnetic resonance and X-ray diffraction.

Topic 5. PROTEINS 3: RELATION STRUCTURE-FUNCTION AND EVOLUTION OF PROTEINS

Storage and transport of oxygen: myoglobin and hemoglobin. Myoglobin and hemoglobin as examples of protein evolution. Use of protein sequences for the analysis of evolutionary relationships. Allosterism and cooperativity of hemoglobin. Different forms of hemoglobin: physiological adaptation and molecular pathology.

Topic 6. BIOLOGICAL CATALYSIS.

Nature and function. Classification and nomenclature of enzymes. Effects of catalysts on chemical reactions: general mechanisms. Description of enzymatic mechanisms. Enzymatic kinetics: Michaelis-Menten model. Enzymatic cofactors. Enzymatic inhibition. Regulation of enzymatic activity: allosterism, covalent modification and changes in enzyme concentration. Biomedical and biotechnological applications.

Topic 7. SUGARS AND POLYSACCHARIDES.

Monosaccharides: description and properties. Classification. Monosaccharide derivatives. Disaccharides and Oligosaccharides. Structural and reserve polysaccharides. Glycoproteins, proteoglycans, and glycolipids. Oligosaccharide Markers

Topic 8. NUCLEIC ACIDS.

Nature and function. Nucleotides. Primary structure of nucleic acids. Secondary structure: Watson and Crick model and alternative structures. Tertiary structure: overlap of DNA and transfer RNA. Complex DNA-proteins: organization of the chromosome.

Topic 9. RECOMBINANT DNA TECHNIQUES.

DNA cloning materials and methodology. Construction of DNA libraries. Selection and search for DNA sequences: hybridization. The sequence of DNA. Genome projects Some applications of genetic engineering. Genomics and proteomics.

Topic 10. LIPIDS AND BIOLOGICAL MEMBRANE.

Types of lipids and functions. Membrane structural lipids. Other lipids with specific biological activity. Lipoproteins Structure and properties of biological membranes.

PROBLEMS

The content of this section, which will be presented in the form of a dossier at the beginning of the semester. It will include a with a selection of problems to be solved and defended "in situ". Those sessions will focus on certain aspects as acid-base, chemical equilibrium, free energy and constant equilibrium, methods of purification and analysis of macromolecules and enzyme kinetics.

Activities and Methodology

Title	Hours	ECTS	Learning Outcomes
Type: Directed			
Lectures	37	1.48	CM08, CM09, KM14, KM15, KM16, SM10, SM11, SM12, CM08
Problem-solving based sessions	8	0.32	KM15, KM16, SM10, SM11, KM15
Type: Supervised			
Autonomous problem resolution	23	0.92	KM15, KM16, SM10, SM11, KM15
Type: Autonomous			
Research of information and autonomous study	64	2.56	CM08, CM09, KM14, KM15, KM16, SM10, SM11, SM12, CM08

The training activities are divided into two sections: lectures and problem-based learning sessions, each of them with their own specific methodology.

Annotation: Within the schedule set by the centre or degree programme, 15 minutes of one class will be reserved for students to evaluate their lecturers and their courses or modules through questionnaires.

Assessment

Continous Assessment Activities

Title	Weighting	Hours	ECTS	Learning Outcomes
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Deliveries of solved problems	10%	4	0.16	KM14, KM15, KM16, SM10, SM11
Exposition of problem-solving	10%	8	0.32	KM14, KM15, KM16, SM10, SM11
Problem-solving exam	10	1	0.04	KM14, KM15, KM16, SM10, SM11
Theory assessment	70%	5	0.2	CM08, CM09, KM14, KM15, KM16, SM10, SM11, SM12

ASSESSMENT:

Theory

The total weight of the assessment for the theoretical part will be 70% of the final grade for the course. The main assessment of this part will be carried out through continuous assessment with two midterm exams. Each midterm must be passed with a minimum of 4.0 out of 10. If a score below 4.0 is obtained, the failed midterm(s) can be retaken in the resit exam.

The assessment of the theory section can be retaken as indicated at the end of this section.

Problems

Problems will be assessed continuously. The weight of the problems assessment will be 30% of the total. This will be divided into three parts: 1) problem/case solving and group defense in class (groups of 4 students) (10%); 2) problem work and submission in class (10%); 3) individual exam on problems (10%). Failure to attend problem sessions will negatively affect the individual grade.

The assessment of problems is continuous throughout the course and cannot be retaken.

Overall Assessment

The course will be passed when the sum of the different components, weighted according to their specific value in the course, equals or exceeds 5.0 out of 10 points. The course cannot be passed if one or more theory midterms have a grade below 4.0; in this case, the maximum grade that can be recorded will be 4.5.

To participate in the theory resit, according to UAB regulations, students must have previously been assessed in a set of activities whose weight is at least two-thirds of the total grade for the course or module. Therefore, students will receive the grade "Not Assessable" when the assessment activities completed account for less than 67% of the final grade. This means that students must have taken both midterm exams in order to be eligible for the resit, and failure to attend a midterm will result in a "Not Assessable" grade.

Students who have had to retake the course in the resit exam will not be eligible for the highest grade of "Honors Distinction" but may achieve a maximum grade of "Excellent." It is possible to take the resit exam to improve the grade, but this will mean forfeiting the previous grade, and in this case, the "Honors Distinction" cannot be awarded.

Students who are unable to attend an individual assessment due to a justified reason (such as illness, death of a first-degree relative, or accident) and provide the corresponding official documentation to the Course Coordinator will have the right to take a make-up exam, which may be oral.

The maximum overall grade, in the case of not passing both midterms with at least 4 points, will be 4.5.

Single Assessment

The single assessment consists of a single synthesis exam covering the entire theoretical content of the course. The exam will include essay questions or short-answer questions. The grade obtained in this synthesis exam will account for 70% of the final grade. Simultaneously, the problem-solving component of the course will be assessed (30% of the final grade). The single assessment exam will take place on the same date scheduled for the second midterm of the continuous assessment, and the same resit system as for the continuous assessment will apply.

The course will be passed when the overall grade (theory plus problems) exceeds 5.0 out of 10 points; however, a minimum of 4 out of 10 in the theory section will be required for it to be averaged with the problems grade. Otherwise, the course will not be considered passed.

This modality must be requested at the beginning of the course.

Use of AI

In this course, the use of artificial intelligence (AI) technologies for problem-solving is not permitted. Any work that includes AI-generated content will be considered an act of academic dishonesty and may result in a partial or total penalty in the activity's grade.

Bibliography

Basic Bibliography:

- Lehninger. Principles of Biochemistry. Nelson, D. and Cox, M., 8th ed. W.H. Freeman (Macmillan Learning), 2021.

- Biochemistry. Voet D, Voet JG, Charlotte WP, 5th ed. John Wiley & Sons Ltd, 2018.

Software

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Groups and Languages

Please note that this information is provisional until 30 November 2025. You can check it through this [link](#). To consult the language you will need to enter the CODE of the subject.

Name	Group	Language	Semester	Turn
(PAUL) Classroom practices	311	Catalan/Spanish	first semester	afternoon
(PAUL) Classroom practices	312	Catalan/Spanish	first semester	afternoon
(TE) Theory	31	Catalan/Spanish	first semester	afternoon