

Degree programme	Type	Course
Medicine	FB	1

Contact lecturer

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Group languages

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

Prerequisites

There are no official prerequisites. However, it is convenient to review the following subjects of the baccalaureate program:

- Chemical binding types
- Chemical balance. Acid-base balance
- Formulation of organic chemistry
- Types of chemical reactions
- Structure and components of eukaryotic cells

Objectives

The subject is programmed in the first year of the Degree in Medicine (first semester) and forms part of the group of basic education skills. It is, therefore, part of the scientific basis necessary for the training of medical graduates. Its general objectives are the study of the chemical basis of life, specifically applied to the composition and function of the human organism, and the knowledge of the main biochemical elements that contribute to the improvement of medical practice. The subject has a close relationship and complementarity with Biophysics and Cell Biology subjects, both programmed in the first year of the degree.

The achievement of its objectives, in addition to its general importance in the degree, is essential as a basis for the Metabolic Biochemistry subject, scheduled in the second semester of the first course, and is also relevant for several later subjects such as those corresponding to the fields of Physiology, Pharmacology, Genetics, Immunology and Endocrinology.

Learning outcomes

1. Identify the basic processes of life on various levels of organisation: molecule, cell, tissue, organ, and individual.
2. Identify the chemical bases that help to understand the functioning of the organism, at both cell and tissue level.
3. Make correct use of biochemistry terminology.
4. Describe the role of the biomolecules that participate in the life processes of the human organism.
5. Describe the molecular basis of the structure of the biological macromolecules and of how this structure conditions their activity.
6. Identify the rules that govern energy transfer in the chemical processes of the human organism.
7. Identify the mechanisms of enzymatic transformation of biomolecules.
8. Relate the molecular and cellular processes that can be the cause or the consequence pathological manifestations in the organism.
9. Identify the biochemical tools that help to improve medicine.
10. Describe the basic molecular mechanisms of storage, transmission and expression of hereditary information.
11. Explain the molecular significance of the structure and function of the systems of the human organism.
12. Relate alterations to the structure and function of biomolecules to structural and functional alterations to systems of the human organism.
13. Relate the molecular mechanisms that can generate pathological manifestations in the organism.
14. Explain the mechanisms and relate the molecular processes that can be the cause or the consequence of pathological manifestations in the organism.
15. Use specific bibliographic sources and databases on biochemistry to work independently on acquiring further knowledge.
16. Maintain and sharpen one's professional competence, in particular by independently learning new material and techniques and by focusing on quality.
17. Demonstrate, in professional activity, a perspective that is critical, creative and research-oriented.
18. Formulate hypotheses and compile and critically assess information for problem-solving, using the scientific method.
19. Demonstrate basic research skills.
20. Communicate clearly, orally and in writing, with other professionals and the media.
21. Use information and communication technologies in professional practice.

Contents

In addition to the basic physicochemical principles, the contents of the course include the description of the structure and functional roles of biological macromolecules, with special emphasis on the relationship between chemical structure and biological function. It also incorporates the acquisition of skills in some basic techniques of the biochemical laboratory and the conceptual and methodological language of molecular biology.

Thematic blocks of theory and seminars:

Topic I. MOLECULAR CHARACTERISTICS OF LIVING MATTER (3 h theory)

- Chemical elements of living matter
- Biomolecules
- Composition and characteristics of the extracellular and intracellular environment
- Acid-base chemistry. Role of the bicarbonate system in maintaining blood pH

At the end of the topic there will be a seminar session (2 h)

Topic II. BIOENERGETICS (2 h theory)

- General principles: Variation of free energy in chemical reactions
- Role of ATP and other compounds in energy transfers
- Energetics of redox reactions

At the end of the topic there will be a seminar session (2 h)

Topic III. STRUCTURE AND FUNCTION OF PROTEINS (5 h theory)

- Composition, structural levels, functions and classification
- Aminoacids
- Covalent structure of peptides and proteins
- Three-dimensional structure of proteins
- Relationship between structure and function: myoglobin and hemoglobin as examples

When finishing the subject there will be two seminar sessions (4 h)

Topic IV. ENZYMES AND MEMBRANE TRANSPORTERS: FUNCTION, KINETICS AND REGULATION (5 h theory)

- General concepts
- General mechanisms of enzymatic catalysis
- Kinetics of enzymatic reactions and transport across membranes
- Regulation of the enzyme activity

At the end of topics IV and V there will be two seminar sessions (4 h)

Topic VI. MOLECULAR BIOLOGY (10 h theory)

- Nucleotides and Nucleic Acids.
- Genes and Genomes. Cloning of DNA
- Replication of DNA.
- DNA transcription and RNA maturation.
- Genetic Code and Translation.
- Regulation of gene expression.
- Molecular Biology Techniques Applied in Medicine.

When finishing the subject there will be three sessions of seminars (6 h)

LABORATORY PRACTICES

1.- Separation techniques of biomolecules: Fractionation of serum proteins in cellulose acetate and determination of molecular weights by electrophoresis in SDS-polyacrylamide.

2.- Molecular Biology: Detection of polymorphisms by PCR.

Learning activities and methodology

Title	Hours	ECTS	Learning outcomes
LABORATORY PRACTICES (PLAB)	9.5	0.38	
THEORY (TE)	25	1	
SEMINARS (SEM)	18	0.72	
SELF STUDY / PREPARATION OF WRITTEN WORKS	92.5	3.7	

Teaching Methodology

The teaching methodology will consist of theoretical classes (TE), specialized seminars, and laboratory practices (PLAB), all of which are directed activities. The main teaching materials for these activities will be provided through the UAB's Moodle platform.

- Theoretical classes (25 sessions of 1 hour) will be delivered in lecture format for each full enrollment group. During these sessions, the instructors will present the theoretical content and discuss the complementary materials available for the other activities, including self-learning resources.
- Specialized seminars (SATs) (9 sessions of 2 hours) will be held in small groups and will focus on the discussion of problems and practical/clinical cases. Students will have a guide with questions and cases in advance, which they must prepare before or during the session to discuss with their peers and the tutor, who will act as a moderator.
- Laboratory practices (2 sessions of 4.5-5 hours) will involve carrying out experimental protocols following a pre-established guide. After each session, students will be required to complete a set of questions related to the practice.

Additionally, students will have access to personal or group tutorials, which will be scheduled in coordination with the instructor responsible for the theoretical classes.

Note: 15 minutes of one class, within the calendar established by the department or degree program, will be reserved for students to complete the evaluation surveys on the performance of the teaching staff and the course

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

Continuous assessment activities

Title	Weight	Hours	ECTS	Learning outcomes
PLAB1: Evaluation of laboratory questionnaires (reasoning, redaction, graphics, calculation)	5%	0.5	0.02	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21
PLAB2: Evaluation of laboratory questionnaires (reasoning, redaction, graphics, calculation)	5%	0.5	0.02	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21
Exam 1: Written assessments through essay test and/or selection items	50%	2	0.08	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21
Exam 2: Written assessments through essay tests and/or selection items.	40%	2	0.08	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21

EVALUATION OF THIS COURSE CAN BE OF TWO TYPES: CONTINUOUS OR SINGLE ASSESSMENT.

Continuous assessment is the default evaluation method, unless the student expressly requests single assessment through the Academic Management Office of the Faculty, within the established deadlines (see the Faculty Website and Academic Regulations for more information).

1. CONTINUOUS ASSESSMENT

The final grade for the course will be based on several assessable activities:

a) Midterm Exam 1 (P1). Covers content from topics 1 to 4, guided self-learning seminars (SAT) 1 to 6, and the first lab session (PLAB1). It will be an in-person exam, consisting of multiple-choice and/or essay-type questions. Weight: 50% of the final grade, if a score equal to or greater than 5.0 out of 10 is achieved.

b) Midterm Exam 2 (P2). Covers content from topic 5, SATs 7 to 9, and the second lab session (PLAB2). It will also be an in-person exam, with multiple-choice and/or essay-type questions. Weight: 40% of the final grade, if a score equal to or greater than 5.0 out of 10 is achieved.

c) Evaluation of laboratory practices (PLAB). Assessed through a questionnaire or other evidence of acquired competences, with a total weight of 10% of the final grade (5% for each practice). Each lab session will be graded based on the resolution of the questionnaire or associated activity at the end of the session. Attendance at lab sessions is not mandatory; however, students who do not attend will forfeit the grade for that specific practice.

Schedule and requirements to pass the course:

P1 and P2 exams will be held on the dates and in the rooms designated by the Faculty.

To pass the course through continuous assessment, students must meet both of the following requirements:

1. Obtain a grade of 5.0/10 or higher in both P1 and P2 (or their respective make-up exams).

Achieve a weighted average of all assessment activities of 5.0/10 or higher, calculated as: $(P1 \times 0.5) + (P2 \times 0.4) + (PLAB1 \times 0.05) + (PLAB2 \times 0.05)$

MAKE-UP EXAMS: To be eligible for the make-up exam, students must have been previously assessed in

activities that represent at least two-thirds of the total course weight.

a) Partial Make-up: Students who score below 5.0 in either P1 or P2 may retake only the failed part in the final make-up exam. This will be an in-person exam, with multiple-choice and/or essay-type questions, graded out of 10. To pass the course after a make-up exam, the final weighted average must be at least 5.0. Otherwise, the maximum final grade will be 4.8.

b) Global Make-up: Students who fail both P1 and P2 must take a comprehensive make-up exam covering the entire course content. This exam will include material from both midterms, and the grade will account for 90% of the final mark, if the minimum grade achieved is at least 5.0. The remaining 10% will come from the lab practice grades (PLAB). The format will be the same: multiple-choice and/or essay-type questions.

The course will be considered passed with a minimum score of 5.0. The students who have completed less than 67% of the evaluable activities will receive a grade of "Not assessable."

2. SINGLE ASSESSMENT: Students may opt for the single assessment system, in accordance with Faculty regulations. Single assessment is based on the same course content, competency acquisition, and academic standards as continuous assessment.

The single assessment exam consists of two parts:

a) Integrated evaluation of theoretical knowledge from topics 1 to 5, guided self-learning seminars (SAT) 1 to 9, and practical skills from the seminars and laboratory sessions (PLAB1 and 2). Weight: 90%, if the minimum grade achieved is at least 5.0. The exam will take place on the same date and time scheduled for the second midterm of the continuous assessment.

b) Evaluation of laboratory practices (PLAB). Assessed through a questionnaire or other evidence of acquired competences, with a total weight of 10% of the final grade (5% for each practice). Each lab session will be graded based on the resolution of the questionnaire or associated activity at the end of the session. Attendance at lab sessions is not mandatory; however, students who do not attend will forfeit the grade for that specific practice. Specific evaluation of the understanding of laboratory concepts. Weight: 10%. Attendance at lab sessions is not mandatory; however, students who do not attend will forfeit the grade for that specific practice.

If not passed, students may take a make-up exam with the same single assessment format, which will be held on the date and time set by the Faculty for continuous assessment make-up exams

Make-up for Single Assessment (SA): Students who opted for single assessment and score below 5.0 in the single assessment exam may take a specific make-up test for this modality. This exam will account for 90% of the final grade, if the minimum grade achieved is 5.0. The remaining 10% will come from the lab practice grades (PLAB). The course will be considered passed with a minimum score of 5.0.

Students who do not attend the scheduled exams will receive a grade of "Not assessable."

Academic Misconduct: Any irregularity committed during an assessment activity (including academic misconduct, plagiarism, or the improper use of artificial intelligence, unless such use is explicitly authorized in the course guide) that may lead to a significant alteration of the grade will result in that assessment being graded as 0 (zero).

If the course guide establishes that obtaining a minimum grade in that assessment is an essential requirement for passing the course, or if multiple irregularities occur in different assessment activities within the same course, the final grade for the course will be 0 (zero). Without prejudice to the above, disciplinary proceedings may be initiated against any student who engages in any of these irregularities.

Bibliography

It is recommended to work regularly with the following books. Titles marked with an asterisk (*) indicate that they are available free of charge in electronic format through the UAB library website, either in their latest edition or in previous ones.

Comprehensive textbooks:

- Nelson DL, Cox MM. *Lehninger Principles of Biochemistry*, 7th ed. Editorial Omega, 2018.
- Voet D, Voet JG, Pratt CH. *Fundamentals of Biochemistry: Life at the Molecular Level*, 4th ed. Editorial Médica Panamericana, 2016. (*)

Intermediate-level textbooks:

- Stryer L, Berg JM, Tymoczko JL. *Biochemistry: A Short Course*, 7th ed. Editorial Reverté, 2019. (*)
- Lieberman MA, Peet A. *Marks' Basic Medical Biochemistry: A Clinical Approach*, 6th ed. Wolters Kluwer, 2023. (*)

Basic textbooks:

- Denise R. Ferrier. *Lippincott's Illustrated Reviews: Biochemistry*, 7th ed. Wolters Kluwer, 2018. (*)
- John W. Baynes, Marek H. Dominiczak. *Medical Biochemistry*, 6th ed. Elsevier, 2023. (*)
- Feduchi. *Biochemistry: Essential Concepts*, 3rd ed. Editorial Médica Panamericana, 2021. (*)

Use of AI

Restricted use: For this course, the use of Artificial Intelligence (AI) technologies is permitted exclusively for support tasks, such as bibliographic or information searches and text correction.

Students must clearly identify which parts have been generated using such technologies, specify the tools used, and include a critical reflection on how these tools have influenced both the process and the final outcome of the activity.

Lack of transparency in the use of AI for any assessable activity will be considered a breach of academic integrity and may result in a partial or total penalty on the grade for the activity, or more severe sanctions in serious cases.

Software

no need for specific software

Course groups and languages

The information provided is provisional until November 30. After this date, you will be able to consult the language of each group through this [link](#). To access the information, you will need to enter the course CODE

Type of teaching	Group	Language	Semester	Shift
(PLAB) Practical laboratories	1	Catalan/Spanish	first semester	morning-mixed
(SEM)	1	Catalan/Spanish	first	afternoon

Seminars			semester	
(PLABs) Suport a les pràctiques de laboratori	1	Catalan/Spanish	first semester	morning-mixed
(PLAB) Practical laboratories	2	Catalan/Spanish	first semester	morning-mixed
(SEM) Seminars	2	Catalan/Spanish	first semester	afternoon
(PLABs) Suport a les pràctiques de laboratori	2	Catalan/Spanish	first semester	morning-mixed
(PLAB) Practical laboratories	3	Catalan/Spanish	first semester	morning-mixed
(SEM) Seminars	3	Catalan/Spanish	first semester	afternoon
(PLABs) Suport a les pràctiques de laboratori	3	Catalan/Spanish	first semester	morning-mixed
(PLAB) Practical laboratories	4	Catalan/Spanish	first semester	morning-mixed
(SEM) Seminars	4	Catalan/Spanish	first semester	afternoon
(PLABs) Suport a les pràctiques de laboratori	4	Catalan/Spanish	first semester	morning-mixed
(PLAB) Practical laboratories	5	Catalan/Spanish	first semester	morning-mixed
(SEM) Seminars	5	Catalan/Spanish	first semester	afternoon
(PLABs) Suport a les pràctiques de laboratori	5	Catalan/Spanish	first semester	morning-mixed
(PLAB) Practical laboratories	6	Catalan/Spanish	first semester	morning-mixed
(SEM) Seminars	6	Catalan/Spanish	first semester	afternoon
(PLABs) Suport a les pràctiques de laboratori	6	Catalan/Spanish	first semester	morning-mixed
(PLAB) Practical laboratories	7	Catalan/Spanish	first semester	morning-mixed
(SEM) Seminars	7	Catalan/Spanish	first semester	afternoon
(PLABs)	7	Catalan/Spanish	first	morning-mixed

Suport a les pràctiques de laboratori			semester	
(PLAB) Practical laboratories	8	Catalan/Spanish	first semester	morning-mixed
(SEM) Seminars	8	Catalan/Spanish	first semester	afternoon
(PLABs) Suport a les pràctiques de laboratori	8	Catalan/Spanish	first semester	morning-mixed
(PLAB) Practical laboratories	9	Catalan/Spanish	first semester	afternoon
(SEM) Seminars	9	Catalan/Spanish	first semester	morning-mixed
(PLABs) Suport a les pràctiques de laboratori	9	Catalan/Spanish	first semester	afternoon
(PLAB) Practical laboratories	10	Catalan/Spanish	first semester	afternoon
(SEM) Seminars	10	Catalan/Spanish	first semester	morning-mixed
(PLABs) Suport a les pràctiques de laboratori	10	Catalan/Spanish	first semester	afternoon
(PLAB) Practical laboratories	11	Catalan/Spanish	first semester	afternoon
(SEM) Seminars	11	Catalan/Spanish	first semester	morning-mixed
(PLABs) Suport a les pràctiques de laboratori	11	Catalan/Spanish	first semester	afternoon
(PLAB) Practical laboratories	12	Catalan/Spanish	first semester	afternoon
(SEM) Seminars	12	Catalan/Spanish	first semester	morning-mixed
(PLABs) Suport a les pràctiques de laboratori	12	Catalan/Spanish	first semester	afternoon
(PLAB) Practical laboratories	13	Catalan/Spanish	first semester	afternoon
(SEM) Seminars	13	Catalan/Spanish	first semester	morning-mixed
(PLABs) Suport a les pràctiques de laboratori	13	Catalan/Spanish	first semester	afternoon

(PLAB) Practical laboratories	14	Catalan/Spanish	first semester	afternoon
(SEM) Seminars	14	Catalan/Spanish	first semester	morning-mixed
(PLABs) Suport a les pràctiques de laboratori	14	Catalan/Spanish	first semester	afternoon
(PLAB) Practical laboratories	15	Catalan/Spanish	first semester	morning-mixed
(SEM) Seminars	15	Catalan/Spanish	first semester	morning-mixed
(PLABs) Suport a les pràctiques de laboratori	15	Catalan/Spanish	first semester	morning-mixed
(PLAB) Practical laboratories	16	Catalan/Spanish	first semester	morning-mixed
(SEM) Seminars	16	Catalan/Spanish	first semester	morning-mixed
(PLABs) Suport a les pràctiques de laboratori	16	Catalan/Spanish	first semester	morning-mixed
(PLAB) Practical laboratories	17	Catalan/Spanish	first semester	afternoon
(SEM) Seminars	17	Catalan/Spanish	first semester	morning-mixed
(PLABs) Suport a les pràctiques de laboratori	17	Catalan/Spanish	first semester	afternoon
(PLAB) Practical laboratories	18	Catalan/Spanish	first semester	afternoon
(SEM) Seminars	18	Catalan/Spanish	first semester	morning-mixed
(PLABs) Suport a les pràctiques de laboratori	18	Catalan/Spanish	first semester	afternoon
(PLAB) Practical laboratories	19	Catalan/Spanish	first semester	morning-mixed
(SEM) Seminars	19	Catalan/Spanish	first semester	afternoon
(PLABs) Suport a les pràctiques de laboratori	19	Catalan/Spanish	first semester	morning-mixed
(PLAB) Practical	20	Catalan/Spanish	first semester	morning-mixed

laboratories				
(SEM) Seminars	20	Catalan/Spanish	first semester	afternoon
(PLABs) Suport a les pràctiques de laboratori	20	Catalan/Spanish	first semester	morning-mixed
(TE) Theory	101	Catalan/Spanish	first semester	afternoon
(TE) Theory	102	Catalan/Spanish	first semester	afternoon
(TE) Theory	103	Catalan/Spanish	first semester	morning-mixed
(TE) Theory	104	Catalan/Spanish	first semester	morning-mixed