

Year 2025/2026 481103 - Biochemistry

Information about the subject

Degree: Bachelor of Science Degree in Dentistry

Faculty: Faculty of Medicine and Health Sciences

Code: 481103 Name: Biochemistry

Credits: 6,00 ECTS Year: 1 Semester: 1

Module: Module 1: Relevant Basic Biomedical Sciences in Dentistry

Subject Matter: Biochemistry Type: Basic Formation

Field of knowledge: Health sciences

Department: Biomedical Sciences

Type of learning: Classroom-based learning

Languages in which it is taught: English, Spanish

Lecturer/-s:

481A Jose Miguel Hernandez Andreu (Responsible Lecturer) jmiguel.hernandez@ucv.es

<u>Juan Carlos Marín Payá</u> jc.marin@ucv.es

481GIQ <u>Jose Miguel Hernandez Andreu</u> (English Responsible jmiguel.hernandez@ucv.es

Lecturer)

<u>Juan Carlos Marín Payá</u> jc.marin@ucv.es



Year 2025/2026 481103 - Biochemistry

Module organization

Module 1: Relevant Basic Biomedical Sciences in Dentistry

Subject Matter	ECTS	Subject	ECTS	Year/semester
HUMAN ANATOMY	12,00	Embryology and General Anatomy I	6,00	1/1
		General Anatomy II and Oral Anatomy	6,00	1/2
Biology	18,00	Biology	6,00	1/1
		Histology	6,00	1/2
		Microbiology	6,00	1/2
Physiology	6,00	Human and Oral Physiology	6,00	1/2
Biochemistry	6,00	Biochemistry	6,00	1/1
MODERN LANGUAGE	12,00	Modern Language: English	6,00	2/2
		Modern language: Spanish	6,00	2/2



Year 2025/2026 481103 - Biochemistry

Learning outcomes

At the end of the course, the student must be able to prove that he/she has acquired the following learning outcomes:

R1 Knows the types and functions of biomolecules.

R2 Identifies metabolic pathways and know how to integrate them.

R3 Knows the applications of biochemical knowledge in the field of dentistry.

R4 Knows how to use different work techniques in the laboratory.

R5 Interprets the results obtained in the practices.

R6 The student is able to prepare documents on biochemistry and work in a team.

R7 The student is able to search for information in bibliographic sources, and know how to analyse them.



Year 2025/2026 481103 - Biochemistry

Competencies

Depending on the learning outcomes, the competencies to which the subject contributes are (please score from 1 to 4, being 4 the highest score):

GENERAL	Weighting			
	1	2	3	4
CG1 I aCapacity for analysis and synthesis			x	
CG2 I bOrganizational and planning skills		x		
CG12 FInterpersonal skills		x		
CG3 I cOral and written communication in the native language		X		
CG23 SMotivation for quality	x			
CG4 I dKnowledge of a foreign language		x		
CG14 FCritical Reasoning		x		
CG5 I eComputer skills related to the field of study	x			1
CG15 FEthical commitment		x		
CG6 I f Information management capacity		x		
CG16 SAutonomous learning		x		
CG17 SAdaptation to new situations	x			
CG8 I hDecision making	x			
CG9 P iTeamwork		x		
CG19 SLeadership	x			



Year 2025/2026 481103 - Biochemistry

PECIFIC	Weighting			
	1	2	3	4
CE A 1 Know the essential elements of the dental profession, including ethical principles and legal responsibilities.	х			
CE A 2 Understand the importance of such principles for the benefit of the patient, society and the profession, with special attention to professional secrecy.	X			
CE A 3 Identify the patient's concerns and expectations, as well as to communicate effectively and clearly, both orally and in writing, with patients, relatives, the media and other professionals.	x			
CE A 4 Understand and recognize the social and psychological aspects relevant to the treatment of patients.	X			
CE A 5 Know how to apply the principles of anxiety and stress management to oneself, to patients and to other members of the dental team.	X			
CE A 6 Understand the importance of developing a professional practice with respect to patient autonomy, beliefs and culture.	X			
CE A 7 Promote autonomous learning of new knowledge and techniques, as well as motivation for quality.		X		
CE A 8 Know how to share information with other health professionals and to work as a team.	X			
CE A 9 Understand the importance of maintaining and using records with patient information for subsequent analysis, preserving the confidentiality of the data.	X			
CE A 1(Know and identify the psychological and physical problems derived from gender violence in order to train students in the prevention, early detection, assistance, and rehabilitation of the victims of this form of violence.	x			
CE B 1'Understand the basic biomedical sciences on which dentistry is based to ensure proper oral care.				X
CE B 1:Understand and recognize the normal structure and function of the stomatognathic system, at the molecular, cellular, tissue and organic level, in the different stages of life.				x
CE B 1:Understand and recognize the science of biomaterials essential for dental practice as well as the immediate management of possible allergies to them.	x			



Year 2025/2026 481103 - Biochemistry

CE B 14Know about general disease processes, including infection, inflammation, immune system disorders, degeneration, neoplasm, metabolic disorders and genetic disorders.		x	
CE B 1tBe familiar with the general pathological features of diseases and disorders affecting organ systems, specifically those with oral impact.	x		
CE B 16Understand the fundamentals of action, indications and efficacy of drugs and other therapeutic interventions, knowing their contraindications, interactions, systemic effects and interactions on other organs, based on available scientific evidence.	X		
CE B 1 Understand and recognize the principles of ergonomics and safety at work (including control of cross-infection, radiation protection and occupational and biological diseases).			
CE B 1Know, critically evaluate and know how to use clinical and biomedical information sources to obtain, organize, interpret and communicate scientific and health information.	x		
CE B 1\(\)Know the scientific method and have the critical capacity to value the established knowledge and the new information. Be able to formulate hypotheses, collect and critically evaluate information for the resolution of problems, following the scientific method.	X		





Year 2025/2026 481103 - Biochemistry

Assessment system for the acquisition of competencies and grading system

Assessed learning outcomes	Granted percentage	Assessment method
R1, R2, R3	60,00%	MULTIPLE CHOICE TEST: Multiple choice test with one correct answer. This shows to greater extent the contents acquired by the student.
R4, R5	10,00%	PRACTICAL: Written test in which the student is asked to solve practical exercises, clinical cases or problems about the contents of different subjects.
R1, R2, R3, R6, R7	25,00%	ASSIGNMENTS: The student, ether individually or in a group, develops a theme which reviews or researches, and he/she presents it, in writing, for assessment by the teacher.
R1, R2, R3	5,00%	CLASS PARTICIPATION: The teacher assesses the participation, involvement and progress the student makes in acquiring knowledge and skills in theory and practical classes and seminars. This is never more than 5% of the final grade.

Observations

The section "Tests" refers to the final exam. To pass the subject you will need to obtain aminimum grade of 4 out of 10 in the final exam. In the "Works" section, the activities carried outon the UCVNet platform throughout the course will be evaluated. In the "Participation in class" section, attendance, attitude and participation will be considered. In the "Practices" section, thegrade of the report/exercises proposed after the practice as well as the attitude and participation inthem will be taken into account.MENTION OF DISTINCTION: According to Article 22 of the Regulations governing the Evaluation and Qualification of UCV Courses, the mention of "Distinction of Honor" may be awarded by the professor responsible for the course to students whohave obtained, at least, the qualification of 9 over 10 ("Sobresaliente"). The number of "Distinction of Honor" mentions that may be awarded may not exceed five percent of the number of studentsincluded in the same official record, unless this number is lower than 20, in which case only one "Distinction of Honor" may be awarded. This subject does not offer a single assessment, as it requires mandatory practical activities withactive student participation.MENTION OF DISTINCTION:In accordance with the regulations governing the assessment and grading of subjects in force atUCV, the distinction of "Matrícula de Honor" (Honours with Distinction) may be awarded to studentswho have achieved a grade of 9.0 or higher. The number of "Matrículas de Honor" (Honours withDistinction) may not



Year 2025/2026 481103 - Biochemistry

exceed five percent of the students enrolled in the group for the correspondingacademic year, unless the number of enrolled students is fewer than 20, in which case a single "Matrícula de Honor" (Honours with Distinction) may be awarded. Exceptionally, these distinctionsmay be assigned globally across different groups of the same subject. Nevertheless, the total number of distinctions awarded will be the same as if they were assigned by group, but they may be distributed among all students based on a common criterion, regardless of the group to which they belong. The criteria for awarding "Matrícula de Honor" (Honours with Distinction) will be determined according to the guidelines stipulated by the professor responsible for the course, as detailed in the "Observations" section of the evaluation system in the course guide.

MENTION OF DISTINCTION:

In accordance with the regulations governing the assessment and grading of subjects in force at UCV, the distinction of "Matrícula de Honor" (Honours with Distinction) may be awarded to students who have achieved a grade of 9.0 or higher. The number of "Matrículas de Honor" (Honours with Distinction) may not exceed five percent of the students enrolled in the group for the corresponding academic year, unless the number of enrolled students is fewer than 20, in which case a single "Matrícula de Honor" (Honours with Distinction) may be awarded. Exceptionally, these distinctions may be assigned globally across different groups of the same subject. Nevertheless, the total number of distinctions awarded will be the same as if they were assigned by group, but they may be distributed among all students based on a common criterion, regardless of the group to which they belong. The criteria for awarding "Matrícula de Honor" (Honours with Distinction) will be determined according to the guidelines stipulated by the professor responsible for the course, as detailed in the "Observations" section of the evaluation system in the course guide.

Learning activities

The following methodologies will be used so that the students can achieve the learning outcomes of the subject:

M1 Lecture.

Problem Solving.

Explanation of contents by the teacher. Explanation of knowledge and skills.

M2 Practical basic sciences laboratory sessions, practical

simulation laboratory sessions, virtual hospital and

dissecting room.

M10 Carrying out bibliographic reviews and practical work experience dissertations.

M13 Personal preparation of written texts, essays, problem solving, seminars.



Year 2025/2026 481103 - Biochemistry

M15

Personalised Attention. Period of instruction and/or guidance carried out by a tutor with the aim of analysing with the student his/her work, activities and evolution in learning of subjects.

IN-CLASS LEARNING ACTIVITIES

	LEARNING OUTCOMES	HOURS	ECTS
THEORY CLASS M1, M10, M13	R1, R2, R3, R7	50,00	2,00
SEMINAR M2, M10, M13, M15	R1, R2, R3, R4, R5, R6, R7	2,00	0,08
TUTORING M15	R1, R2, R3, R4, R5, R6, R7	2,00	0,08
EVALUATION M15	R1, R2, R3, R4, R5, R6, R7	2,00	0,08
PRACTICAL CLASS M2, M10, M13, M15	R4, R5, R6	4,00	0,16
TOTAL		60,00	2,40

LEARNING ACTIVITIES OF AUTONOMOUS WORK

	LEARNING OUTCOMES	HOURS	ECTS
INDIVIDUAL WORK M10, M13	R1, R2, R3, R4, R5, R6, R7	90,00	3,60
TOTAL		90,00	3,60



Year 2025/2026 481103 - Biochemistry

Description of the contents

Description of the necessary contents to acquire the learning outcomes.

Theoretical contents:

Content block Contents



Year 2025/2026 481103 - Biochemistry

BLOCK I. STRUCTURAL BIOCHEMISTRY

Unit 1. Introduction to the chemistry of life.Cellularfundamentals. Chemical fundamentals.GeneticFoundations. Evolutionary foundations. Unit 2. Water. Structure. Water as a solvent. Thehydrophobic effect.lonization of water. Weak acids andbases. Water as areagent. Buffer solutions. Unit 3. Amino acids, peptides and proteins. Protein characterization. The covalent structure ofproteins. Proteinsequences and evolution. Unit 4. Thethree-dimensional structure of proteins. Primary, secondary, tertiary and quaternary structure. Denaturation and proteinfolding. Unit 5. Functions of proteins. Oxygen-bindingproteins. Interactions between proteins and ligands: immunesystem.Interactions between proteins modulated bychemicalenergy: actin, myosin and molecular motors. Unit 6. Collagen. Structure. Composition ofTropocollagen.Synthesis of Collagen. Types of bonds inmature Collagen.Importance in the structure of the teeth.Unit7. Enzymes. Introduction to enzymes. Kineticenzyme.Mechanisms. Regulatory enzymes.Unit 8. Carbohydrates and glycobiology. Monosaccharidesanddisaccharides. Polysaccharides. Glycoconjugates: proteoglycans, glycoproteins and glycolipids. Unit 9. Nucleotides and nucleic acids. Structureandfunctions .Unit 10. Lipids. Storage lipids. Lipids inmembranes. Lipidsas pigments, cofactors and signals. Unit11. Recombinant DNA technology. Cloned. From genestogenomes. From genomes to proteomes. Alterationofgenomes and new products of biotechnology. Unit 12. Biological membranes and transport. Composition and architecture of the membranes. Dynamics of themembranes. Solute transport through membranes.Biosignalization.Molecular mechanisms of signaltransduction.



Year 2025/2026 481103 - Biochemistry

BLOCK II: BIOENERGY AND METABOLISM

Topic 13. Principles of bioenergetics. Bioenergetics and thermodynamics. Topic 14 Glycolysis, gluconeogenesisand the pentosephosphate pathway. Glycolysis. Routes of entry to glycolysis. Fermentation. Gluconeogenesis. Thepentose phosphatepathway. Topic 15 Principles of metabolicregulation: glucose andglycogen. Glycogen metabolism inanimals. Regulation ofmetabolic pathways. Coordinatedregulation of glycolysisand gluconeogenesis. Coordinatedregulation of glycogensynthesis and degradation. Unit 16 Thecitric acid cycle. Acetyl-CoA production. Reactions and regulation of the citric acid cycle. Unit 17 Catabolism of fattyacids. Digestion, mobilization and transport of fats. Fattyacid oxidation. Ketone bodies. Unit 18 Amino acid oxidationand urea production. Metabolic destinations of aminogroups. Nitrogen excretionand the urea cycle. Pathways ofdegradation of amino acids. Topic 19 Oxidative phosphorylation. Electron transferreactions in themitochondria. ATP synthesis. Regulation of oxidative phosphorylation. Topic 20 Lipid biosynthesis. Biosynthesis offatty acids andeicosanoids. Triglyceride biosynthesis. Membranephospholipid biosynthesis. Cholesterol, steroid, and isoprenoid biosynthesis. Unit 21 Biosynthesis of aminoacids and nucleotides. Nitrogen metabolism. Amino AcidBiosynthesis. Moleculesderived from amino acids. Nucleotide biosynthesis anddegradation. Topic 22 Hormonal regulation and integration of metabolism. Structure and function of hormones. Tissues with specificmetabolism. Hormonal regulation of metabolisTemporary organization

Temporary organization of learning:

Block of content	Number of sessions	Hours
BLOCK I. STRUCTURAL BIOCHEMISTRY	15,00	30,00
BLOCK II: BIOENERGY AND METABOLISM	15,00	30,00



Year 2025/2026 481103 - Biochemistry

References

- Lehninger. Principios de Bioquímica. Cox, M.M. - Nelson, D.L. Editorial Omega,2014 Sextaedición.- Netter Bioquímica esencial. Peter Ronner. Ed: Elsevier. 1ª edición, 8/2019.