Information about the subject

Degree: Bachelor of Science Degree in Podiatry

Faculty: Faculty of Medicine and Health Sciences

Code: 471105 **Name:** Biophysics and Biochemistry

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

Module: BASIC TRAINING

Subject Matter: BIOCHEMICALS **Type:** Basic Formation

Field of knowledge: Health Sciences

Department: Biomedical Sciences

Type of learning: Classroom-based learning

Languages in which it is taught: Spanish

Lecturer/-s:

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Module organization

BASIC TRAINING

Subject Matter	ECTS	Subject	ECTS	Year/semester
ANATOMY	12,00	Anatomy	6,00	1/1
		Anatomy of the Lower Extremity	6,00	1/2
BIOLOGY	12,00	Cellular and Tissular Biology	6,00	1/1
		Microbiology	6,00	1/2
PHARMACOLOGY	6,00	Pharmacology	6,00	2/1
MODERN LANGUAGE	6,00	English	6,00	2/2
STATISTICS	6,00	Biostatistics	6,00	1/1
PSYCHOLOGY	6,00	Psychology	6,00	1/2
PHYSIOLOGY	6,00	Physiology	6,00	1/1
BIOCHEMICALS	6,00	Biophysics and Biochemistry	6,00	1/1
ANTHROPOLOGY	6,00	Anthropology	6,00	1/2

Recommended knowledge

High School Knowledge

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 the metabolic pathways and know how to integrate them.

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

R4 The student demonstrates knowledge on physical mechanics and elasticity to understand and analyze certain situations and biomechanical processes.

R5 Searches for bibliographic information from different sources and knows how to analyze it with a critical and constructive spirit.

R6 Acquires knowledge of thermodynamics describing biological processes of energy and heat transmission.

R7 The student is acquainted with the main disciplines that make up the physical sciences, their foundations and areas of work.

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):

BASIC		Weighting			
		1	2	3	4
CB1	Students demonstrate knowledge and understanding in an area of study that is at the core of general secondary education, and is often at a level that, while supported by advanced textbooks, also includes some aspects that involve knowledge from the cutting edge of their field of study.		x		

GENERAL		Weighting			
		1	2	3	4
CG2	Students know the structure and function of the human body, especially of the lower limb, semiology, mechanisms, causes and general manifestations of the disease and diagnostic methods of medical and surgical pathological processes, interrelating general pathology with foot pathology.			x	

SPECIFIC		Weighting			
		1	2	3	4
CE26	Students know the subjects of biophysics, physiology and biochemistry related to the human body Immediate principles. Biochemistry and biophysics of membranes, muscles and nerves. Acquire knowledge of the functions and regulation of the different organs and systems of the human body.				x

TRANSVERSAL		Weighting			
		1	2	3	4
CT1	Analytical capabilities			x	

CT7	Problem solving		x	
CT8	Decision making		x	
CT14	Critical Reasoning		x	
CT15	Ethical commitment		x	
CT16	Autonomous learning		x	
CT17	Adaptation to new situations		x	

Assessment system for the acquisition of competencies and grading system

Assessed learning outcomes	Granted percentage	Assessment method
R1, R2, R3	5,00%	Open questions
R1, R2, R3, R4	75,00%	Tests
R1, R2, R3, R4	10,00%	Practice (exercises, case studies, problems)
R1, R2, R3, R4	10,00%	Class participation

Observations

BIOCHEMISTRY PART
Multiple-choice exam (35%), class participation (10%), and practicals (5%).
BIOPHYSICS PART
Multiple-choice exam (35%), open-ended questions (10%), and practicals (5%).
The evaluation of the open-ended questions (10%) and practicals (5%) will be conducted continuously throughout the semester and will consist of solving and submitting, via the Virtual Campus, a series of problems, tasks, and exercises related to the topics covered.
The assignments must be submitted **before the end of the semester (December 20th)**, and **there is NO RESIT OPTION** for this component.

IMPORTANT: Although the two components of the course, Biochemistry and Biophysics, are graded separately, it is **mandatory to obtain a minimum of 4 out of 10 points** in each subject in order to calculate the average. The final grade for the course will be the **average of both components**.
In this course, a single final assessment option is not available, as the completion of practical activities with active student participation is mandatory.
This decision is based on the practical workload and the importance of classroom attendance, which requires students to participate in person and therefore prevents them from choosing a single final assessment.

Use of AI:
Students may use AI for personal study of the course. Students may not use AI to complete assessable tasks, unless required for a specific activity and indicated by the instructor. If AI is used in any of the activities, students must cite where in the activity it was used, which AI tool was used,

and for what purpose.

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 Theoretical classes (TC). Training activity preferably oriented to the acquisition of knowledge skills. It is characterised by the fact that students are spoken to. Also called master class or expository class, it refers to the oral exposition made by the teacher, (with the support of a blackboard, computer and cannon for the exposition of texts, graphics, etc.).

M4 Classroom practice (CPA). Training activity of work in groups that is developed in the classroom. It includes work with documents (e.g.: work with articles or documents, clinical case studies, diagnostic analyses, etc). The size of the group is variable, in a range of 10-20 students.

M6 Laboratory Practice (CPL). Training activity of work in groups that is developed in the Laboratory. It includes the sessions where students actively and autonomously develop, supervised by the teacher, laboratory experiments. The size of the group is variable, in a range of 10-20 students.

M7 Tutorials (T). Set of activities carried out by the teacher with personalised attention to the student or in small groups with the aim of reviewing and discussing the materials and topics presented in the classes, seminars, readings, completion of assignments, etc. The aim is to ensure that education is truly a comprehensive training of the student and is not reduced to a transfer of information. It is, therefore, a personalized relationship of help in which the teacher-tutor attends, facilitates and guides one or more students in the formative process.

M8 Evaluation (Ev). It is the set of processes that try to evaluate the learning results obtained by the students and expressed in terms of acquired knowledge, capacities, developed skills or abilities and manifested attitudes. It covers a wide range of activities that can be developed for students to demonstrate their training (e.g. written, oral and practical tests, projects or assignments,). It also includes Official Calls.

M10 Estudio del alumno: Preparación individual de lecturas, ensayos, resolución de problemas, seminarios

IN-CLASS LEARNING ACTIVITIES

	LEARNING OUTCOMES	HOURS	ECTS
Theoretical lessons M1	R1, R2, R3, R4	45,00	1,80
Practice lessons M4	R1, R2, R3, R4	6,00	0,24
Office Hours M7	R1, R2, R3, R4	5,00	0,20
Evaluation M8	R1, R2, R3, R4	4,00	0,16
TOTAL		**60,00**	**2,40**

LEARNING ACTIVITIES OF AUTONOMOUS WORK

	LEARNING OUTCOMES	HOURS	ECTS
Autonomous work M10	R1, R2, R3, R4	70,00	2,80
Group work M10	R1, R2, R3, R4	20,00	0,80
TOTAL		**90,00**	**3,60**

Description of the contents

Description of the necessary contents to acquire the learning outcomes.

Theoretical contents:

Content block	Contents
UNIT 0: REVIEW OF MATHEMATICAL PHYSICS CONCEPTS	Physical quantities and their classification, Order of magnitude, Systems of units Dimensional analysis and laws of scale Significant figures, Scientific notation Scalars and vectors Coordinate systems and components of a vector Vector algebra
UNIT I FUNDAMENTALS OF BIOMECHANICS	Newton's laws and their applications. Energy conservation. Torque and balance. Forces in muscles and bones. Elasticity. Effort and deformation. Elasticity and rupture.
UNIT II Thermodynamics	Thermal expansion of solids, liquids, and gases Calorimetry. Heat transfer. Thermography Metabolism and mass loss Exercises
UNIT III VIBRATIONS AND WAVES	Wave phenomena. Bioacoustics. Applications of sound in diagnosis and therapy. Doppler. ultrasound

UNIT IV STRUCTURAL BIOCHEMISTRY	Introduction to Biochemistry Water Amino acids, peptides and proteins. Structure, peptide bond. Function. Collagen. collagen types. Structure. Synthesis and main pathologies. Enzymes Coenzymes and cofactors. Kinetic enzyme. mechanisms. Carbohydrates. Structure and link. Main disaccharides and polysaccharides. Nucleotides and nucleic acids. Structure and function. Link. DNA and RNA types. Lipids. Classification. Structure and function. major lipids.
UNIT V INTRODUCTION TO METABOLISM AND BIOENERGETICS	Glycolysis. Fermentation. Gluconeogenesis. Pentose phosphate pathway. main enzymes. Glucose and glycogen regulation. Acetyl-COA production. Krebs cycle. main enzymes. Regulation Oxidative phosphorylation. ATP synthesis. Fatty acid metabolism. Beta oxidation. protein metabolism. Urea cycle. Purine catabolism. Gout disease
UNIT VI: Biophysics and biochemistry practical session	There will be a 4-hour practical session covering both biophysics and biochemistry activities.

Temporary organization of learning:

Block of content	Number of sessions	Hours
UNIT 0: REVIEW OF MATHEMATICAL PHYSICS CONCEPTS	2,00	4,00
UNIT I FUNDAMENTALS OF BIOMECHANICS	6,00	12,00
UNIT II Thermodynamics	3,00	6,00
UNIT III VIBRATIONS AND WAVES	3,00	6,00
UNIT IV STRUCTURAL BIOCHEMISTRY	8,00	16,00
UNIT V INTRODUCTION TO METABOLISM AND BIOENERGETICS	6,00	12,00
UNIT VI: Biophysics and biochemistry practical session	2,00	4,00

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4. Cussó F., López C., Villar Raúl, **FÍSICA DE LOS PROCESOS BIOLÓGICOS**, Ariel (2 004)
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