

Biological Bases of the Human Body

Code: 102993
ECTS Credits: 9

Degree	Type	Year	Semester
2500892 Physiotherapy	FB	1	1

Contact

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Use of Languages

Principal working language: catalan (cat)
Some groups entirely in English: No
Some groups entirely in Catalan: No
Some groups entirely in Spanish: No

Teachers

Bernardo Castellano López
Joaquima Navarro Ferreté
Carles Gil Giró
Jose Manuel Lopez Blanco
Vicenç Català Cahís
Maria Oliver Bonet
Beatriz Almolda Ardid

Prerequisites

There are no official prerequisites.
It is highly recommended that students have taken Biology in the High School.

Objectives and Contextualisation

The subject is programmed in the first year of the Degree in Physiotherapy and is part of the group of the subjects of basic training It constitutes, therefore, part of the scientific basis necessary for graduates in Physiotherapy. Its general objectives are the study of the biochemical, cellular and histological fundamentals of the human organism, as an essential foundation for the knowledge of its composition and its functions.

Competences

- Analyse and synthesise.
- Develop independent learning strategies
- Display knowledge of the morphology, physiology, pathology and conduct of both healthy and sick people, in the natural and social environment.
- Display knowledge of the sciences, models, techniques and instruments around which physiotherapy is structured and developed.
- Solve problems.

Learning Outcomes

1. Analyse and synthesise.
2. Develop independent learning strategies
3. Explain the functioning of the the human body in health in order to have a sound basis for understanding the processes that induce disease.
4. Explain the fundamental biochemical principles of the functioning of the human body.
5. Explain the theories of cell biology, envisioning the cell as a functional unit.
6. Identify life-threatening situations and perform basic and advanced life support manoeuvres.
7. Identify physiological and structural changes that can take place as a result of the injury and/or disease process in the different systems.
8. Solve problems.

Content

In this area, the study of the cell is intended as a functional unit, the biochemical foundations of the cell functioning of the human body and human histology. The study of the operation of the different systems of the human body. In addition, general physiopathology will be studied and deepened in the inflammation and tissue repair processes, pain, infection, fever and aseptic condition. Basic life support, neoplastic pathophysiology, immunodeficiencies and blood groups will be also studied.

1.- BIOCHEMISTRY. (module coordinator: Carles Gil Giró, carles.gil@uab.cat)

Distributive areas:

I. Structure and Function of Biomolecules (Carles Gil, carles.Gil@uab.cat)

- Water, weak acids and biological buffers.
- Amino acids, peptides and proteins.
- Three-dimensional structure of proteins.
- Proteins with structural function: Colleagen.
- Proteins with catalytic function: Enzymes.
- Hormones, embrane receptors and cell signaling.
- Nuclotides and nucleic acids.
- Glucides.
- Lipids.

II. Introduction to metabolism (José Manuel López, josemanuel.lopez@uab.cat)

- Definition of nutrients, foundations of digestion and absorption of nutrients
- General principles of bioenergetics. Role of ATP in energy transfers
- General characteristics of intermediate metabolism: catabolic and anabolic pathways

III. Metabolism of carbohydrates (José Manuel López, josemanuel.lopez@uab.cat)

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III. Metabolism of carbohydrates (José Manuel López, josemanuel.lopez@uab.cat)

- Digestion and absorption of carbohydrates
- Metabolism of carbohydrates: Glucolysis, gluconeogenesis and metabolism of glycogen
- Cycle of tricarboxylic acids
- Mitochondrial electronic transport and oxidative phosphorylation

IV. Metabolism of lipids (José Manuel López, josemanuel.lopez@uab.cat)

- Digestion, absorption and transport of lipids in the diet
- Metabolism of lipids with energy and reserve function
- Cholesterol metabolism
- Transport of lipids in the blood: lipoproteins

V. Metabolism of nitrogen compounds (José Manuel López, josemanuel.lopez@uab.cat)

- Nitrogen balance. Exogenous and endogenous origin of amino acids
- Metabolism of amino acids
- Nitrogen derivatives of amino acids

VI. Integration and control of metabolism (José Manuel López, josemanuel.lopez@uab.cat)

- Metabolic characteristics of some tissues: Liver, muscle, adipose tissue, brain
- Metabolic interrelations between the tissues during the fasting-starvation cycle
- Hormonal and metabolic changes during exercise

2.- CELLULAR BIOLOGY. (module coordinator: Vicenç Català, vicenc.catala@uab.cat)

Distributive areas:

I. Levels of cell organization (Vicenç Català, vicenc.catala@uab.cat)

- General organization of the cell
- General characteristics of prokaryotic cells
- General characteristics of eukaryotic cells

II. Membrane plasmatic and internal membranous system (Vicenç Català, vicenc.catala@uab.cat)

- Functions of the Cell Membrane
- Chemical composition, structure and macromolecular organization of the plasma membrane. Lipids and proteins of the plasma membrane
- Transport of small molecules, macromolecules and particles. Endocytosis, pinocytosis, phagocytosis, exocytosis
- Glycocalix
- Internal compartmentation: internal membranous system, membrane flow, protein trafficking between compartments
- Smooth and rough endoplasmic reticulum. Structure and functions

- Golgi apparatus: Structure and functions

III. Mitochondria and peroxisomes (Vicenç Català, vicenc.catala@uab.cat)

- External and internal membranes and mitochondrial intermembrane space. Mitochondrial Array

- Function and Biogenesis

- Transport of mitochondrial proteins

- Mitochondrial diseases

- Morphology of Peroxisomes. Structure, composition and function. Peroxisomal diseases

IV. Cytosol and Cytoskeleton (Joaquima Navarro, joaquima.navarro@uab.cat)

- Structural organization of the cytosol. Functions

- Synthesis and folding of proteins. Modifications of proteins. Ubiquitination

- Actin filaments: Structure and chemical composition. Actin stable and unstable filaments. Functions

- Microtubules. Structure and chemical composition. Stable and stable microtubules. Functions

- Intermediate Filaments: Structure and chemical composition. Type and location

V. Cell adhesion (Joaquima Navarro, joaquima.navarro@uab.cat)

- Membrane adhesion and cellular molecules

- Types of Unions: occlusives, anchorage, cell-cell adhesives, matrix cell adhesives, and communicants

VI. Core. Nuclear activity (Vicenç Català, vicenc.catala@uab.cat)

- Nuclear envelope. Nuclear matrix and matrix

- Nucleoplasm. Structure and organization of the chromatin of the nucleus: hereditary material

- Chromatin activity: Transcription and maturation, replication

VII. Mitosis and Meiosis (Vicenç Català, vicenc.catala@uab.cat)

- Mitotic division. Phases of mitosis: Profase, prometaphase, metaphase, anaphase, telophase

- Chromosomic condensation cycle. Cycle of fragmentation and assembly of the nucleus wrap. Cytokinesis

- Meiosis; comparison between mitosis and meiosis. Premeiotic interface

- First meiotic division. Profase I: stadiums. Organization of chromatin. Role of chiasma. Synapsis and meiotic recombination

- Second meiotic division

- Introduction to Genetics and Inheritance. Set of characters that transmit individuals to offspring

- Introduction to Genetics and Inheritance. Set of characters that transmit individuals to offspring depending on the segregation of the genome and genetic laws.

3.- HISTOLOGY. (module coordinator: Bernardo Castellano, bernardo.castellano@uab.cat)

Area distribution:

I. Introduction to the tissues of the human body

- Introduction to Histology. Definition of tissue.

- Classification of the basic tissues

- Histological processing

II. Nervous system

- Central nervous system (CNS) and peripheral (SNP)

- Basic structure of the CNS: white substance and gray substance

- Main areas of the CNS and its organization

- Description of the main constituent elements of the SNP: spinal and visceral ganglia, plexus and nerves

III. Locomotive apparatus

- Structure of the bones and joints

- Tendons and fascia

- Skeletal muscular fibers and their types

- Neuromuscular joints

IV. Cardio-respiratory system

- Components of the cardiovascular system

- Blood and lymph vessels

- Organization of the cardiac wall

- Elements of the driving system of the heart

- Components of the respiratory system: trachea, bronchial system and lungs

V. Genitourinary tract

-Microscopic structure of the kidney

- Urinary tracts: tunics

-Histological structure of the male and female genital tract

Methodology

As stated in the table

Activities

Title	Hours	ECTS	Learning Outcomes
Type: Directed			
Class practices	8	0.32	1, 3, 5, 7, 8
Laboratory	8	0.32	1, 8

Specialized seminars	11	0.44	1, 2, 4, 5, 8
Theory	38	1.52	1, 4, 5
Type: Autonomous			
Elaboration of dossiers	19	0.76	1, 4, 5, 8
Individual study	135	5.4	1, 4, 5, 8

Assessment

In this subject, each thematic block (Biochemistry, Cell Biology and Histology) is evaluated independently in two calls. The first evaluation will be done at the end of each thematic block, and will release subject matter corresponding to them if the grade is equal to or greater than 5.

The second call will be the final exam of the three thematic blocks, which will be assessed independently in a single session. To this announcement will be able to present the students who want to improve the note obtained in the partial exams. Introducing the improvement of the note means giving up the note obtained in the partial one. You can improve the notes of each thematic block independently. To pass the final exam you will have to obtain a minimum of 5 in each one of the modules or thematic blocks.

The final grade of the subject results from the average of the notes of the three thematic blocks, if no block obtains a note less than 5. In the case that the note of one or more thematic blocks is less than 5, the Final note will be "Fail." The subject will be passed for approval if the resultant note of the average of the three modules is equal or superior to 5.

From the second enrollment, repeating students will only have to evaluate the specific blocks that were not been passed. This exemption will be maintained for a period of three additional courses.

Evaluation system:

THEORY: Written evaluation using objective tests, multiple selection items or essay tests Restricted questions with an approximate global weight between 70 and 80%.

PRACTICE: Evaluation of practical sessions and practical cases using objective tests

Writings, test tests for restricted questions, which are complemented with item proofs

Multiple choice or alternate response items with an approximate weight of between 10 and 25%.

Attendance and active participation in class and seminars, with an approximate global weight of 5%.

Failure to attend any or all of the parts of the final exam will correspond to a final grade of "No evaluable".

- Evaluation of Biochemistry:

THEORY:

- Final exam, which can represent between 70-100% of the final mark. This exam includes a test

Multi-answer and a part of conceptual questions / problems. The average of the two sides gives the note of the exam.

SEMINARS:

- Continuous assessment exercises associated with the seminars, which can represent between 0-30% of the final note Only the continuous evaluation note will be considered when it is higher than the grade of the final exam, and therefore serves to increase the final grade.

The final mark of the Biochemistry module will have a value of 33.3% of the mark of the subject.

- Evaluation of cell biology:

THEORY:

- This consists of a multi-test exam, which corresponds to 60% of the mark. If the note is less than 5, then there will be a second evaluation that can be a short conceptual question test.

This exam allows students who want to improve the note of the multitest exam.

Applying for this exam means giving up the test exam mark.

CLASSROOM PRACTICE:

- The evaluation of the bibliographical work on diseases corresponds to 40% of the note. Work will be evaluated on the public oral presentation of one of the proposed diseases (40%), the degree of assumption of contents of the disease developed by the group of the student (40%), and the degree of assumption of contents of the other diseases developed in the same academic course by others groups (20%), in the basis of a test of 12 multi-answer questions made shortly after oral presentations.

In the case of a second or later enrollment, you do not need to go back to doing the activity, as long as you notice it.

It has been equal to or greater than 5, and the qualification obtained in the bibliographic work on illnesses in previous courses will apply to the calculation of the final grade. So, the note of the activity is saved for the repeaters.

The mark obtained in the multitest must be at least 5 in order to make the note average of the activity on diseases.

The final note of the Cell Biology module will have a value of 33.3% of the mark of the subject.

- Evaluation of Histology:

THEORY:

- Final exam, true / false type test, which corresponds to 50% of the note.

PRACTICE:

- Continuous assessment exercises associated to the laboratory practices, which correspond to 50% of the note.

The note of the continuous assessment part will make an average with the final test final mark, always when this last note (final exam type test) is at least 4.

The final grade of the Histology module will have a value of 33.3% of the mark of the subject.

Assessment Activities

Title	Weighting	Hours	ECTS	Learning Outcomes
Evaluation of the practical sessions	10-25%	3	0.12	1, 2, 3, 4, 5, 7, 6, 8
Written evaluation using tests	70-80%	3	0.12	1, 2, 3, 4, 5, 7, 6, 8

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