1. BASIC INFORMATION

Subject	Biological Processes I
Titration	Degree in Physiotherapy
School/ Faculty	Medicine, Health and Sports
Course	First
ECTS	6
Character	Basic
Language/s	Spanish and/or French and/or English
Modality	Campus-based
Semester	First semester
Academic year	2024-2025
Coordinating Teacher	Catalina Santiago Dorrego / Silvia de Vidania Ballesteros

2. PRESENTATION

Biological Processes I is a basic subject that is taught in the first year of the degree in Physiotherapy. Students are provided with a series of basic knowledge important in their training as a future health professional in the field of physics applied to biological processes and fundamental techniques in physiotherapy, as well as in the area of cell biology.

Upon completing this course, the student will be able to identify the structure and function of cells as well as understand the stages and mechanisms of its division, describe the structure of genes and their regulatory mechanisms, and identify the type of genetic variants that are known. In addition, you will be able to describe the main metabolic pathways of the cell and define energy from a physical point of view (energy balance, energy content of food and energy used in physical activity). Likewise, they will be able to describe what light, electromagnetic radiation, and ionizing and non-ionizing radiation are; as well as, that they are sound and ultrasound, and will understand their application as a source of energy and principle of ultrasound.

3. LEARNING OUTCOMES

Knowledge:

- **WITH3.** Identify the different organ structures and systems of the human body, as well as their function.
- **WITH6.** To know and understand the morphology, physiology, pathology and behaviour of people, both healthy and sick, in the natural and social environment.
- **WITH7.** To know and understand the scientific models, techniques and instruments that form the foundation of physiotherapy.
- **WITH8.** To know the physiological and structural changes that may occur as a result of the application of physiotherapy.
- Identify the structure and function of the cell and the stages and mechanisms of its division.

- Describe the structure of genes and their regulatory mechanisms, and identify the type of genetic variants that are known.
- Describe the main metabolic pathways of the cell.
- Define energy from a physical point of view: energy balance, energy content of food and energy used in physical activity.
- Describe what sound is, what ultrasound is and its application as a source of energy and principle of ultrasound.
- Describe light, electromagnetic radiation, ionizing and non-ionizing radiation.

Competences:

- **COMP25.** Use information and communication technologies for data research and analysis, research, communication and learning.
- **COMP27.** Collaborate with others in achieving shared academic or professional objectives, actively participating with empathy and exercising active listening and respect for all members.
- **COMP30.** To show ethical behaviors and social commitment in the performance of the activities of a profession, as well as sensitivity to inequality and diversity.

4. CONTENT

The subject is organized into 6 theoretical learning units comprising 17 topics with theoretical content, 6 laboratory practices and 3 workshops.

THEORY:

Unit 1. Introduction to Biophysics and Biology.
Topic 1. Introduction. Levels of organization. Introduction to the Physics and Chemistry of Life
Topic 2. Cell origin and evolution. Differences between prokaryotic and eukaryotic cells.

Unit 2 – The human cell: structure and function.
Topic 3. The plasma membrane: structure and transport.
Topic 4. The cytoskeleton: the sarcomere as an example.
Topic 5. Cellular organelles.
Topic 6. Cell signaling and stimulation. Mechanotransduction.

Unit 3 – The Human Cell: The Dogma of Molecular Biology
Topic 7. Stages and control of cell division: DNA duplication and mitosis.
Topic 8. Genes, chromosomes and genome. Types of mutations.
Topic 9. Transcription and protein synthesis. Introduction to the concept of epigenetics.

Unit 4 – The concept of energy applied to biology.
Topic 10. Physical principles on which biological energy transformations are based. Role of enzymes.
Item 11. Laws of thermodynamics

Unit 5 – The human cell: metabolism.
Topic 12. Human cell metabolism. Cellular respiration, aerobic and anaerobic metabolism. Interrelationship between metabolic pathways

Unit 6. Physical factors (of the environment) and their basis in physiotherapy treatments.
Topic 13. Temperature: concepts and mechanisms of temperature regulation and application in physiotherapy.
Item 14. Sound waves – Ultrasound: Ultrasound.
Topic 15. Electromagnetic waves: light and non-ionizing radiation.

LABORATORY PRACTICES:

Practice 1: Optical microscope. Differences between prokaryotic and eukaryotic cells.
Practice 2: Osmosis.
Practice 3: Obtaining, fixation, and staining a histological preparation: the blood smear.
Practice 4: Biomolecule analysis.
Practice 5: Mitosis and karyotype
Practice 6: Blood Types and Transfusions.

WORKSHOPS:

Workshop 1: Thermology.
Workshop 2: Ultrasounds.
Workshop 3: Basal metabolism. Integrated Activity with Structure and Function: Systems I.

5. TEACHING-LEARNING METHODOLOGIES

The following teaching-learning methodologies will be employed:

- Master class.
- Case method.
- Cooperative learning.
- Learning based on workshop teachings.
- Simulation environments.

6. LEARNING ACTIVITIES

The types of training activities that will be carried out and the student's dedication in hours to each of them are identified below:

Campus-based mode

Training activity	Number of hours
Lectures	25 h
Practical application seminars	5 h
Analysis and resolution of cases	4 p.m.
Preparation of reports and writings	2 pm
Activities in workshops and/or laboratories	12 h
Freelance work	56 h
Debates and colloquia	8 h
Guardianship	12 h
Face-to-face assessment tests	2 h
TOTAL	**150 h**

The activities that will be developed in the subject are:

Activity 1 - Integration of theoretical knowledge.

- Master classes. Debates.
- Presentation by the teacher in the classroom, with the aim of transmitting knowledge and activating cognitive processes in the student.
- Verification of the knowledge acquired on the syllabus developed in class.

Activity 2- Cooperative self-learning: preparation of report, delivery and debate.

- The students, in groups, will delve into concepts studied in the area of biophysics: thermodynamics, thermology, waves and ultrasound.
- Elaboration, delivery and debate in the classroom. Own signature.

Activity 3- Cooperative and integrated self-learning: preparation of report, delivery and debate.

- The students, in groups, will delve into the importance of metabolic processes in an integrated way with the subject of Structure and Function: Systems I.
- Elaboration, delivery and debate in the classroom. Own signature.

Activity 4 - Laboratory practices.

- Consolidation through practical sessions of the knowledge of the eukaryotic cell and the biological processes associated with it.
- Participation of students in practical classes through the preparation of a document to solve the questions raised during the practice.

Activity 5 – Individual self-learning of theoretical and/or practical content through digital tools.

- Carrying out self-assessment activities through the virtual campus and/or different digital tools.

7. ASSESSMENT

The evaluation systems are listed below, as well as their weight on the total grade of the subject:

Face-to-face modality:

Evaluation system	Weight
Face-to-face assessment tests	60 %
Reports and Briefs	15 %
Case/problem	15 %
Lab/workshop practice notebook	10 %

To pass the subject in the ordinary call, the **process of continuous evaluation** of the different training activities must be passed. The evaluation will be carried out in 3 blocks.

Assessable block	Evaluation system	Weight
1	Objective tests of theoretical knowledge	50%
2	Assessable training activities	30%
3	Laboratory Practices	20%

On the Virtual Campus, when you access the subject, you will be able to consult in detail the evaluation activities you must carry out, as well as the delivery dates and evaluation procedures for each of them.

7.1. Ordinary call

To pass the subject in the ordinary call, you must obtain a grade greater than or equal to 5.00 out of 10.00 in the final grade (weighted average) of the subject.

It is essential that the **grade of each assessable block is equal to or greater than 5.**

7.2. Extraordinary call

The blocks not passed in the ordinary call must be recovered. The virtual campus will indicate how each assessable block should be recovered.

To pass the subject in the extraordinary call, you must obtain a grade greater than or equal to 5.00 out of 10.00 in the final grade (weighted average) of the subject.

It is essential that the **grade of each assessable block is equal to or greater than 5.**

8. SCHEDULE

This section indicates the schedule with delivery dates of assessable activities of the subject:

Assessable activities	Date
Laboratory practice	Sit 5
Laboratory practice	Sem 9
Laboratory practice	Shem 10
Human Metabolism Activity	Sem 11
Biophysics workshop	Shem 12
Laboratory practice	Sem 13
Biophysics workshop	Sem 14
Laboratory practice	Sem 17

Laboratory practice	Sem 18

This schedule may be modified for logistical reasons of the activities. Any modification will be notified to the student in a timely manner.

9. BIBLIOGRAPHY

- ALBERTS B et al, Introduction to cell biology, 3rd ed., Editorial Panamericana, 2012.
- ALBERTS B et al, Molecular Biology of the Cell, 5th ed., Editorial Omega, 2010.
- CALVO A, Biomedical Cell Biology, 1st ed., Editorial Elsevier, 2015.
- COOPER GM, La célula, 6th ed., Editorial Marbán, 2014.
- LODISH H et al, Biología celular y molecular, 5th ed., Editorial Medica Panamericana, 2011.

10. EDUCATIONAL GUIDANCE AND DIVERSITY UNIT

From the Educational Guidance and Diversity Unit (ODI) we offer support to our students throughout their university life to help them achieve their academic achievements. Other pillars of our action are the inclusion of students with specific educational support needs, universal accessibility on the different campuses of the university and equal opportunities.

This Unit offers students:

1. Accompaniment and follow-up through the realization of personalized counseling and plans for students who need to improve their academic performance.
2. In terms of attention to diversity, non-significant curricular adjustments are made, that is, at the level of methodology and evaluation, in those students with specific educational support needs, thus pursuing equality of opportunities for all students.
3. We offer students different extracurricular training resources to develop various skills that will enrich them in their personal and professional development.
4. Vocational guidance through the provision of tools and advice to students with vocational doubts or who believe that they have made a mistake in the choice of the degree

Students who need educational support can write to us at:
orientacioneducativa@universidadeuropea.es

11. SATISFACTION SURVEYS

Your opinion matters!

The European University encourages you to participate in satisfaction surveys to detect strengths and areas for improvement in the teaching staff, the degree and the teaching-learning process.

The surveys will be available in the survey space of your virtual campus or through your email.

Your assessment is necessary to improve the quality of the degree. Thank you very much for your participation.