# 1. BASIC INFORMATION

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|---|---|
| **Course** | Structure and function of the human body |
| **Degree program** | Physiotherapy |
| **School** | Sports and Physical Activity Sciences |
| **Year** | 1st |
| **ECTS** | 12 |
| **Credit type** | Basic |
| **Language(s)** | Spanish and/or English, French, Italian |
| **Delivery mode** | Campus-based |
| **Semester** | S1 and S2 |
| **Academic year** | 2024-2025 |
| **Coordinating professor** | Elena Velarde Fernández |

# 2. PRESENTATION

The aim of this subject is to provide students with the knowledge to understand the functions of the human body and acquire a complete and inclusive body concept. It widens the horizon to comprehend the response of the human body to the performance of physical activities and sports. It also helps understanding other subjects included in the present degree program. It provides the necessary foundation of physiological and anatomical concepts for the future physiotherapist, and stablishes the basis for critical and scientific thinking.

# 3. COMPETENCIES AND LEARNING OUTCOMES

**Core competencies:**

- CB1: That students have shown to possess and understand knowledge in an area of study that starts from the base of general secondary education, and is usually found at a level, which, although supported by advanced textbooks, also includes some aspects that imply knowledge coming from the forefront of their field of study.
- CB2: That students know how to apply their knowledge to their work or vocation in a professional way and possess the skills that are usually demonstrated through the elaboration and defence of arguments and problem solving within their area of study.
- CB3: That students have the ability to gather and interpret relevant data (normally within their area of study) to make judgments that include a reflection on relevant issues of a social, scientific or ethical nature.
- CB4: That students can transmit information, ideas, problems and solutions to both specialized and non-specialized audiences.
- CB5: That students have developed those learning skills necessary to undertake further studies with a high degree of autonomy

**Cross-curricular competencies:**

- CT2: Problem solving
- CT4: Ability of analysis and synthesis

- CT6: Ability to manage information
- CT13: Critical thinking
- CT19: Autonomous learning

**Specific competencies:**

- CE29: Know and use the International Anatomical Nomenclature to name the different anatomical structures.
- CE30: Describe anatomical structures with appropriate language.
- CE31: Know the anatomical elements that make up each system studied, its macroscopic morphology and its relationships.
- CE32: Know the morphological and functional aspects of these anatomical elements.
- CE33: Recognize anatomical structures with imaging techniques.
- CE34: Have the ability to understand and synthesize simple anatomical articles.
- CE35: Relate the different anatomical concepts, with their function.
- CE36: Respect the practice material.
- CE37: Acquire a rational, complete and integrated understanding of the functioning mechanisms of the human body in a state of health.
- CE 38: Recognize the relationship between the structure and function of organs and systems.
- CE39: Describe the basic processes carried out by each of the organs of the human body
- CE40: Understand how the human body functions as a coordinated entity in maintaining homeostasis.
- CE41: Know and understand the mechanisms that regulate and control functional systems
- CE42: Understand the body's ability to detect and respond to changes.
- CE43: Know and understand how the body defends itself against disease-causing agents
- CE44: Know the mechanisms that participate in the supply of nutrients to the tissues and in the elimination of waste products from them.
- CE45: Know the mechanisms that give movement to our body and understand the mechanical properties of muscle contraction.
- CE46: Recognize functional changes associated with aging
- CE47: Apply theoretical knowledge to the resolution of physiological problems that arise as problems or as practical demonstrations.
- CE48: Upon completion of physiology studies, the student should be able to recognize whether the body is functioning correctly or not, but not diagnose the cause of the abnormality.
- CE49; Know and understand in an integrated way the responses and adaptations of the organism to physical activity.
- CE50: Relate the basic concepts of physiology on the structure and functioning of the different organs and systems with the specific situation of physical activity.
- CE51: Understand the concept of physical activity as a stimulus that tends to alter the situation of homeostasis.
- CE52: To know the different beneficial effects of the regular practice of physical activity on health.
- CE53: Know and understand the role of skeletal muscle in the genesis and control of movement.
- CE54: Acquire an integrated knowledge of the different factors involved in the production of force by skeletal muscle.
- CE55: Understand the mechanisms of adaptation of skeletal muscle to exercise in its application to both sports training and rehabilitation processes
- CE56: Understand in a related and integrated way the participation of the different energy sources during physical activity.
- CE57: Know and understand basic concepts of nutrition in its relationship with physical activity.
- CE58: Know theoretically and applied the different indicator parameters of functional capacity.
- CE59: Understand the most important limiting factors of functional capacity and understand the concept of fatigue.

- CE60: Know the differences in responses and adaptations to physical exercise according to age and sex.
- CE61: Know the relationship between physical activity and various pathologies: effects of physical activity and considerations regarding the prescription of exercise in subjects with these pathologies.

**Learning outcomes:**

- LO1: Understanding of fundamental concepts related to the contents of the subject.
- LO2: Knowledge of the relationships between the structure and function of the different organs and systems.
- LO3: Resolution of problems and cases raised from the different contents of the subject.
- LO4: Comprehension and synthesis of texts related to the subject.

The following table shows the relationship between the competencies developed during the course and the learning outcomes pursued:

| Competencies | Learning outcomes |
|---|---|
| CB1, CB3, CB4, CT2, CT4, CT6, CE29, CE30, CE31, CE32, CE33, CE36, CE37, CE38, CE39, CE45, CE48, CE49 | LO1: Understanding of fundamental concepts related to the contents of the subject. |
| CB2, CB3, CB4, CT2, CT6, CT13, CE35, CE36, CE37, CE40, CE41, CE42, CE43, CE44, CE47, CE49, CE50, CE51, CE53, CE54, CE55, CE56, CE57, CE58, CE59, CE60 | LO2: Knowledge of the relationships between the structure and function of the different organs and systems |
| CB2, CB3, CB5, CT2, CT6, CT19, CE32, CE33, CE34, CE35, CE37, CE42, CE46, CE47, CE49, CE50, CE52, CE54, CE56, CE58, CE59, CE61 | LO3: Resolution of problems and cases raised from the different contents of the subject |
| CB3, CB4, CB5, CT4, CT6, CT13, CE34, CE37, CE40, CE47, CE49, CE50, CE57, CE58, CE61 | LO4: Comprehension and synthesis of texts related to the subject |

# 4. CONTENT

The subject is organized in ten learning units, each of them with different topics.

Unit 1. Introduction, homeostasis and internal environment.
1.1. Basic general concept on human body organization
1.2. Organization levels
1.3. Anatomical position: axis, planes and reference points

1.4. International anatomical nomenclature
1.5. Homeostasis and regulation.
1.6. Body fluids composition.

Unit 2. Nervous system
2.1. Organization of the nervous system.
2.2. Anatomy of the central nervous system. Encephalon and spinal cord.
2.3. Peripheral nervous system. Ganglia, cranial nerves, spinal nerves and plexuses.
2.4. Neurophysiology.
2.5. Nerve transmission. Synapses and neurotransmitters.
2.6. Sensory pathways.
2.7. Autonomic nervous system.

Unit 3. Skeletal muscle
3.1. Muscle tissue
3.2. The muscle fibre. Types of motor units.
3.3. Excitation – contraction coupling.
3.4. Muscle contraction.
3.5. Motor control.
3.6. Muscle, strength and training.

Unit 4. Endocrine system.
4.1. Hormonal mechanisms of action.
4.2. General organization of the endocrine system
4.3. Hypothalamus-hypophysis axis.
4.4. Endocrine pancreas
4.5. Pineal gland.

Unit 5. Immune system
5.1. White cells and immune response.
5.2. Inflammation.
5.3. Specific inmune response

Unit 6. Respiratory system
6.1. Introduction: structure and functions.
6.2. Superior and inferior airways.
6.3. Ventilatory mechanics.
6.4. Gas exchange.
6.5. Nervous regulation.
6.6. Exercise and respiratory system.

Unit 7. Cardiovascular system.
7.1. Heart and blood vessels anatomy.
7.2. Heart roles.
7.3. Electrical cardiac events. Electrocardiogram.
7.4. Mechanical cardiac events. Cardiac cycle.
7.5. Regulation of vascular circulation.
7.6. Nervous control of the cardiovascular function.
7.7. Cardiovascular responses and adaptations to exercise.

Unit 8. Digestive system and energy sources during physical activity.
8.1. General functions.
8.2. Anatomy of the digestive tract.
8.3. Digestive physiology.
8.4. Intake regulation.

8.5. Energy sources during physical activity.

Unit 9. Urinary system
9.1. Anatomy of the urinary system.
9.2. Ultrastructure of the kidney: the nephron.
9.3. Urine formation.
9.4. Regulation of urine formation.
9.5. Urine excretion: urination.

Unit 10. Clinical application of exercise physiology.
10.1. Interactions of the energy systems during exercise.
10.2. Intensity definition according to VO2max.
10.3. Reference parameters in exercise.
10.4. Exercise prescription.

## 5. TEACHING-LEARNING METHODOLOGIES

The types of teaching-learning methodologies used are indicated below:

- Master classes
- Problem based learning (PBL)
- Flipped classroom
- Learning environments

## 6. LEARNING ACTIVITIES

Listed below are the types of learning activities and the number of hours the student will spend on each one:

**Campus-based mode:**

| Learning activity | Number of hours |
|---|---|
| Master Classes | 58 |
| Self learning | 100 |
| Virtual seminars | 35 |
| Laboratory practice | 55 |
| Tutorships | 20 |
| Analysis of practical cases | 32 |
| **TOTAL** | **300** |

## 7. ASSESSMENT

Listed below are the assessment systems used and the weight each one carries towards the final course grade:

**Campus-based mode:**

| Assessment system | Weight |
|---|---|
| Test of knowledge | 60 |
| Practical skills test | 20 |
| Laboratory notebook | 10 |
| On line test | 10 |

When you access the course on the *Campus Virtual*, you'll find a description of the assessment activities you have to complete, as well as the delivery deadline and assessment procedure for each one.

### 7.1. First exam period

To pass the course in the first exam period, you must obtain a final course grade of at least 5 out of 10 (weighted average).

In any case, you will need to obtain a grade of at 5.0 in the final exam in order for it to count towards the final grade along with all the grades corresponding to the other activities.

### 7.2. Second exam period

To pass the course in the second exam period, you must obtain a final grade of at least 5 out of 10 (weighted average).

In any case, you will need to obtain a grade of at 5.0 in the final exam in order for it to count towards the final grade along with all the grades corresponding to the other activities.

The student must deliver the activities not successfully completed in the first exam period after having received the corresponding corrections from the professor, or those that were not delivered in the first place.

## 8. SCHEDULE

This table shows the delivery deadline for each assessable activity in the course:

| Assessable activities | Deadline |
|---|---|
| Anatomy Atlas 1 | S1 - Week 7 |
| Physiology lab 1 | S1 - Week 9 |
| Anatomy Atlas 2 | S1 - Week 11 |
| Physiology lab 2 | S1 – Week 13 |

| | |
|---|---|
| Physiology lab 3 | S1 – Week 13 |
| Physiology lab 4 | S1 – Week 14 |
| Anatomy Atlas 3 | S2 – Week 1 |
| Physiology lab 5 | S2 – Week 2 |
| Anatomy Atlas 4 | S2 – Week 3 |
| Physiology lab 6 | S2 – Week 5 |
| Anatomy Atlas 5 | S2 – Week 6 |
| Anatomy Atlas 6 | S2 – Week 11 |
| PBL1 | S2 – Week 13 |
| PBL 2 y 3 | S2 – Week 14 |
| PBL4 | S2 – Week 15 |

This schedule may be subject to changes for logistical reasons relating to the activities. The student will be notified of any change as and when appropriate.

## 9. BIBLIOGRAPHY

The recommended Bibliography is:


- Fox. Human physiology. McGraw-Hill, 2010.
- Gilroy, A.M. *Atlas of anatomy.* Springer. 2015.
- Katch, McArdle y Katch. Exercise physiology: nutrition, energy and human performance. Lippincott Williams and Wilkins. 2010.
- Netter, F.H. *Atlas of human anatomy.* Elsevier. 2019.
- SILVERTHORN, D.U. Human Physiology: an integrated approach. Pearson, 2016.
- Tortora, J., Derrickson, B. Principles of anatomy and physiology. Wiley, 2011.


## 10. EDUCATIONAL ORIENTATION AND DIVERSITY UNIT

From the Educational Orientation and Diversity Unit (ODI) we offer support to our students throughout their university life to help them reach 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 equalization of opportunities.
From this Unit, students are offered:

1. Accompaniment and follow-up by carrying out counseling and personalized 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 needs for educational support, thereby pursuing equal opportunities for all students.

3. We offer students different extracurricular training resources to develop various skills that will enrich their personal and professional development.
4. Vocational guidance by providing tools and advice to students with vocational doubts or who believe they have made a mistake in choosing the degree.

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

## 11. ONLINE SURVEYS

Your opinion matters!

The Universidad Europea encourages you to participate in several surveys which help identify the strengths and areas we need to improve regarding professors, degree programs and the teaching-learning process.

The surveys will be made available in the “surveys” section in virtual campus or via e-mail.

Your assessment is necessary for us to improve.

Thank you very much for your participation.