

1. OVERVIEW

Subject area	Human Physiology
Degree	Bachelor's Degree in Exercise and Sport Sciences
School/Faculty	Exercise and Sport Sciences and Physiotherapy
Year	Second
ECTS	6 ECTS
Type	Compulsory
Language/s	Spanish/English
Delivery mode	On campus
Semester	S3, S4
Academic year	2024/2025
Coordinating professor	Francisco Javier Pardo Gil

2. INTRODUCTION

Human physiology is the branch of science that helps us to understand the physical and chemical factors responsible for the origins, development and progression of human life. The ability to understand and engage with the third-year subject areas "Physiology of Exercise" and "Physical Activity for Health" is heavily dependent on a solid command of this discipline. The subject area is very closely linked to the first-year subject area "Human Anatomy" and the second-year subject areas "Human Motor Skills" and "Biomechanics of Exercise and Sport".

3. SKILLS AND LEARNING OUTCOMES

Basic skills (CB, by the acronym in Spanish):

- CB1: Students have demonstrated knowledge and understanding of a study area originating from general secondary school education, and are usually at the level where, with the support of more advanced textbooks, they may also demonstrate awareness of the latest developments in their field of study.
- CB2: Students can apply their knowledge to their work or vocation in a professional manner and possess the skills which are usually evident through the forming and defending of opinions and resolving problems within their study area.
- CB3: Students have the ability to gather and interpret relevant data (usually within their study area) to form opinions which include reflecting on relevant social, scientific or ethical matters.
- CB4: Students can communicate information, ideas, problems and solutions to both specialist and non-specialist audiences.
- CB5: Students have developed the learning skills necessary to undertake further study in a much more independent manner.

Cross-curricular skills (CT, by the acronym in Spanish):

- CT1: Independent Learning: Ability to choose the most effective strategies, tools and opportunities for independent learning and implementation of what has been learnt.

- CT6: Oral or written communication: Ability to communicate and gather information, ideas, opinions and viewpoints to understand and be able to act, spoken through words or gestures or written through words and/or graphic elements.
- CT8: Information management: Ability to seek, choose, analyse and integrate information from diverse sources.
- CT11: Planning and time management: Ability to set objectives and choose the right means to achieve them, making efficient use of time and resources.
- CT17: Teamwork: Ability to integrate and collaborate actively with other people, departments and/or organisations to reach common goals.

Specific skills (CE, by the acronym in Spanish):

- CE4: Ability to analyse and apply physiological, biomechanical, psychological and social principles in different areas of physical activity, sport and recreation.
- CE6: Ability to assess levels of physical fitness and motor skills, prescribing and planning health-orientated physical exercises in different age groups.
- CE7: Ability to promote and assess long-lasting and autonomous habits of health-orientated physical activity and sport.
- CE11: Ability to use your own judgement to act in society, using theoretical, academic and professional discourse in relation to exercise and sport sciences.

Learning outcomes (RA, by the acronym in Spanish):

- RA 1. To understand key concepts related to human physiology.
- RA 2. To act professionally when using equipment and following safety protocols for laboratory work, specifically in relation to physiology.
- RA 3. To produce essays in order to study diverse aspects
- RA 4. To produce in-depth analysis and summaries based on searches of key literature about the fundamental aspects of human physiology.

The following table shows how the skills developed in the course match up with the intended learning outcomes:

Skills	Learning outcomes
CB1, CB2, CB3, CB5, CT1, CT6, CE4	RA 1. To understand key concepts related to human physiology.
CT1, CT17, CE6	RA2. To act professionally when using equipment and following safety protocols for laboratory work, specifically in relation to physiology.
CB1, CB2, CB3, CB4, CT1, CT6, CT8, CT11, CE4	RA3. To produce essays in order to study diverse aspects
CB1, CB2, CB3, CB4, CB5, CT1, CT6, CT8, CT11, CT17, CE4	RA4. To produce in-depth analysis and summaries based on searches of key literature about the fundamental aspects of human physiology.

4. CONTENTS

To provide an understanding of the physical and chemical factors responsible for the origins, development and progression of human life. A strong command of this subject is essential for understanding the subject area Physiology of Exercise:

- Conceptual foundations of human physiology
- Biochemistry
- General physiology

- Neurophysiology
- Musculoskeletal system
- Haematology
- Cardiovascular system
- Respiratory system
- Excretory system
- Digestive System
- Endocrinology

This content is organised into the following learning units and topics:

Unit 1: CONCEPTUAL FOUNDATIONS OF HUMAN PHYSIOLOGY. BIOCHEMISTRY AND GENERAL PHYSIOLOGY

- Definition and objectives of human physiology
- Concept of a living organism
- Composition of biomolecules. Main functional groups.
- Types of chemical transformations in cells
- Why is water necessary for life?
- Distribution of water in the body
- Concept of pH, acid, base and buffer
- Distribution of electrolytes in bodily fluids
- Concept of homoeostasis

Unit 2: PHYSIOLOGY OF THE MUSCULOSKELETAL SYSTEM

- Morphofunctional characteristics of skeletal muscle
- Cytological characteristics of the myocyte
- Neuromuscular transmission
- Neuromuscular junction
- Concept of a motor unit
- Muscle contraction mechanism
- Bone
- Soft tissues: tendons and ligaments

Unit 3: NEUROPHYSIOLOGY

- General concepts of neurophysiology
- Nervous system cells
- Neurons
- Glial cells
- Synapses
- Action potential transmission
- General structure of the nervous system
- Motor function control
- Motor functions of the spinal cord
- Muscle proprioceptors
- Somatic reflexes
- Voluntary regulation of motor function
- Autonomic nervous system

Unit 4: PHYSIOLOGY OF THE CARDIOVASCULAR SYSTEM

- Functional anatomy of the heart and blood vessels
- The heart as a pump
- Cardiac parameters
- Rhythmical excitation of the heart
- General concepts of ECGs

- General vascular physiology
- Microcirculation: local flow regulation
- Starling forces
- Lymphatic system
- Haemodynamics
- Blood pressure

Unit 5: HAEMATOLOGY

- Blood composition
- Characteristics and functions of blood cells
- Immunity function
- Haemostasis

Unit 6: PHYSIOLOGY OF THE RESPIRATORY SYSTEM

- Functional anatomy of the respiratory system
- Mechanics of ventilation
- Lung volume and lung capacity
- Communication: Exchange of gasses
- Transportation of gasses
- Respiratory control

Unit 7: PHYSIOLOGY OF THE EXCRETORY SYSTEM

- Functional anatomy
- General concepts of the excretory system
- Nephrons
- Glomerular filtration
- Tubule function
- Renal regulation

Unit 8: THE ENDOCRINE SYSTEM

- General concepts of endocrinology
- Concept and classification of hormones
- The hypothalamus-hypophysis axis
- Thyroid hormones
- Suprarenal glands
- Sex hormones
- The endocrine pancreas
- Hormones that regulate calcium

Unit 9: DIGESTIVE SYSTEM

- Functional anatomy
- Digestion and absorption of biomolecules

5. TEACHING/LEARNING METHODS

The types of teaching-learning methods are as follows:

- Lectures.
- Case studies.
- Collaborative learning.
- Problem-based learning.

6. LEARNING ACTIVITIES

The types of learning activities, plus the amount of time spent on each activity, are as follows:

On campus:

Learning activity	Number of hours
Lectures (on campus)	20
Asynchronous lectures (on campus)	12
Group work (seminars, forum participation, etc. (on campus)	30
Tutorials (on campus)	8
Case studies/workshop activities (on campus)	37
Independent working (on campus)	43
TOTAL	150

7. ASSESSMENT

The assessment methods, plus their weighting in the final grade for the course, are as follows:

On campus:

Assessment system	Weighting
On-campus knowledge tests	40% (30–40)
Learning portfolio (assessable tasks, laboratory work, reports and written work)	20% (20–30)
Participation in classroom activities (presentations, forums)	20% (20–30)
Case study/problem	20% (20–30)

On the Virtual Campus, when you open the course, you can see all the details of your assessment activities and the deadlines and assessment procedures for each activity.

7.1. Ordinary exam period

To pass the subject area in the ordinary exam period you must obtain a grade higher than or equal to 5.0 out of 10.0 in the final grade (weighted average) for the subject area. The grade for each unit

corresponds to the weighted average of all the included activities. A minimum grade of 5 in each of the units is required for them to be included in the weighted average with the other two subject area units.

In each of the two objective knowledge tests, students must achieve a grade of at least 5.0 to pass the unit. After passing the objective knowledge tests, the grade for this unit will be the weighted average of the first and second midterm tests (40% + 60%, respectively).

7.2. Extraordinary exam period (resits)

In order to pass the subject area in the extraordinary exam period, all the requirements set out above for the ordinary exam period must be met.

8. TIMELINE

This section presents the timeline and submission dates for the assessable tasks in this subject area.

Assessable tasks	Date
Activity 1. Laboratory work (electromyography)	Weeks 4-5
Activity 2. Laboratory work (reaction time)	Weeks 9-10
Activity 3. Objective multiple-choice test - intermediate	Weeks 10-11
Activity 4. Laboratory work (spirometry)	Weeks 12-13
Activity 5. Bibliography session	Weeks 14-15
Activity 6. Final objective knowledge test	Week 18

The timeline may be subject to change for logistical reasons related to the activities. Students will be informed of any changes in due time and course.

9. BIBLIOGRAPHY

The reference material for the subject area is as follows:

Silverthorn DE Human physiology : an integrated approach. 2019

Silverthorn DE. Fisiología Humana. 4ª ed Panamericana. 2009

The following is a recommended bibliography:

- Allen C. Laboratory manual for anatomy and physiology 4th ed. 2011.
- Koepen BM Berne & Levy. Physiology 6th ed. Mosby Elsevier. 2010
- Boron W. Medical physiology : a cellular and molecular approach 2nd ed. 2009.
- Brown TA Rapid Review Physiology. Elsevier 2012
- Campbell PN. Bioquímica Ilustrada. 5ª ed Masson 2006
- Feher J Quantitative Human Physiology: An introduction. Elsevier 2012
- Fox SI. Fisiología Humana. 7ª ed Mc Graw-Hill Interamericana. 2004

- Fox SI. Human Physiology. Mc Graw-Hill. 10th ed. 2010
- Gal Iglesias, B. Bases de la Fisiología. Tebar. 2002
- Ganong W. Fisiología Médica. Manual Moderno. 2002.
- Ganong WF. Review of Medical Physiology. 22nd ed. Mc Graw-Hill. 2003
- Guyton AC Hall JE Textbook of Medical Physiology W B Saunders 2011.
- Guyton AC Hall JE. Tratado de Fisiología Médica. 12ª edición. McGraw-Hill. Interamericana. 2011.
- Kent M. Diccionario Oxford de Medicina y Ciencias del Deporte. 2003.
- Lehninger. Principios de Bioquímica. 2002.
- Lieber RL Skeletal muscle. 3th ed. LWW. 2010.
- Martín Cuenca E. Fundamentos de Fisiología. Thompson – Paraninfo. 2006.
- Mathews. Bioquímica 3ª ed. Pearson. 2004.
- Pocock G. Fisiología Humana. Edit. Masson. 2005
- Raff H Medical Physiology: a systems approach. Lange Mc Graw Hill. 2011.
- Rhoades R. Medical Physiology. Lippincott. 2003
- Sherwood L Essential of Physiology. Brooks. 2012.
- Soto JL. Química Orgánica. Ed Síntesis 1999
- Stabler T PhysioEx [TM] 8.0 for human physiology: laboratory simulations in physiology. 2011
- Silbernagl S Color atlas of physiology 6th ed., completely rev. and expanded. 2009.
- Stanfield CL, Germann WJ. Principles of Human Physiology 3th ed. Pearson Int. Ed. 2008.
- Stevens A. Human Histology 3th ed. Elsevier Mosby. 2005.
- Tortora G J. Principios de Anatomía y Fisiología 11ª ed. Panamericana. 2006.
- Tresguerres JAF. Fisiología Humana. 3ª edición. McGraw-Hill. Interamericana. 2005.
- VVAA Diccionario Terminológico de Ciencias Médicas. Masson. 2002
- Artículos científicos

Internet resources

- <http://www.ncbi.nlm.nih.gov/PubMed> (U.S. National Library of Medicine)
- <http://www.scirus.com/srsapp/> (buscador web científico)
- <http://www.fecyt.es/fecyt/home.do> (Fundación Española para la Ciencia y la Tecnología)
- <http://www.nature.com/scitable> (Educational website by Nature group)
- <http://ghr.nlm.nih.gov/glossary=contig> (Diccionario científico del NIH)
- <https://thecrashcourse.com/courses/anatomy> (vídeos divulgativos de Anatomía y Fisiología Humana)
- <https://thecrashcourse.com/courses/biology> (vídeos divulgativos de Biología General y Fisiología Humana)
- <https://thecrashcourse.com/courses/chemistry> (vídeos divulgativos de Bioquímica)

10. DIVERSITY AWARENESS UNIT

Students with special educational needs:

To ensure equal opportunities, curricular adaptations or adjustments for students with special educational needs will be outlined by the Diversity Awareness Unit (UAD, Spanish acronym).

As an essential requirement, students with special educational needs must obtain a report about the curricular adaptations/adjustments from the Diversity Awareness Unit by contacting unidad.diversidad@universidadeuropea.es at the beginning of each semester.

11. STUDENT SATISFACTION SURVEYS

Your opinion matters!

Universidad Europea encourages you to complete our satisfaction surveys to identify strengths and areas for improvement for staff, degree courses and the learning process.

These surveys will be available in the surveys area of your virtual campus or by email.

Your opinion is essential to improve the quality of the course.

Many thanks for taking part.