

Teaching guide

IDENTIFICATION DETAILS

Degree:	Biomedicine		
Scope	Biology and Genetics		
Faculty/School:	Experimental Sciences		
Course:	PHYSIOLOGY		
Type:	Basic Training	ECTS credits:	10
Year:	2	Code:	2147
Teaching period:	Third-Fourth Semester		
Subject:	Physiology		
Module:	Structural and Functional Bases of Biomedicine		
Teaching type:	Classroom-based		
Language:	Spanish		
Total number of student study hours:	250		

SUBJECT DESCRIPTION

This course is intended for students to acquire essential knowledge about the structure and functioning of the organs and systems of the human body, as well as the way in which each of them is regulated and coordinated with the rest to contribute to the functions of the entire organism. You must understand the principles and foundations of the physiological responses of the human body and know the repercussions of the alterations in these responses, the mechanism of action of these alterations and their basic expression.

The teaching methodology used will promote the student's active learning and will raise fundamental questions about their person and their place in society. Physiological knowledge will broaden your view of yourself and, as you approach the results of the scientific method, you will discover both the answers and the limitations of this science and its relationship with others. The skills acquired during this course will lay in our students the necessary foundations for research and understanding of human pathology and the adaptation of the advanced therapies that biomedicine should propose.

GOAL

The objectives of this course are to learn about the functions of tissues, organs and systems of the human being, to understand the cellular and molecular mechanisms that regulate the homeostasis of the healthy human body, and to interpret the effects associated with changes in homeostatic variables. In addition, the detailed knowledge of the human organism together with the acquisition of competence skills through the methodologies used in the subject seek to prepare our students for the search for technical-health solutions to which they are called Biomedical.

PRIOR KNOWLEDGE

Knowledge of cell biology, biochemistry, physics and anatomy, all perfectly attainable with other subjects previously studied in this degree.

COURSE SYLLABUS

BLOCK I: Foundations of Cell Physiology

Topic 1: Introduction to Physiology. Cell physiology: Membrane dynamics. Gradients. Intercellular communication and cell signaling pathways. Model I system: neuron-effector cell. Model II system: hemostasis (blood coagulation)
Theme 2: The concept of internal environment and its vital variables. Concept of homeostasis and elements of the feedback systems responsible for it. Sensitive receptors. Integration centers: introduction to the somatic nervous system, autonomic nervous system and endocrine system. Effectors (neuron, gland, smooth muscle, heart muscle and skeletal muscle). Excitation-contraction coupling.

BLOCK II: Somato-motor functions

Topic 3: Body movement control. Somatosensory receptors. Somatic nervous system: Voluntary control vs. reflex control. Mechanics of body movement.

BLOCK III: Visceral functions

Topic 4: Homeostasis of O₂ and CO₂ concentrations. Normality vs instability. Ventilatory and airway mechanics. Respiratory membrane and pulmonary circulation. Transport and diffusion of gases. Feedback systems. Physiological adaptations to "non-human" situations (freediving, diving and high altitudes).
Topic 5: pH homeostasis. Normality vs instability. Causes of pH variations. Respiratory and renal compensation mechanisms.

Topic 6: Homeostasis of blood volume and blood pressure. Normality vs instability. Heart function. Circulatory function. Renal function Feedback systems (short and long term)

Topic 7: Osmolarity homeostasis and electrolyte concentration. Normality vs. Osmolarity and tonicity of the internal environment. Na⁺, K⁺, Ca²⁺ ion homeostasis.

Topic 8: Glycemic homeostasis. Normality vs dysbiosis. Gastrointestinal function. Nerve regulation of metabolism and gastrointestinal function. Endocrine regulation of glycaemia. Endocrine regulation of metabolism and growth

Topic 9: Temperature homeostasis. Normality vs Temperature regulation by the hypothalamus

Topic 10: Reproductive functions. Female vs. male hormone regulation. Specific physiology of procreation, pregnancy, birth, puberty and menopause. Physiological adaptations in the fetus and the pregnant woman

BLOCK IV: Superior functions

Theme 11: Higher cognitive functions: awareness, thinking, emotions, behavior, learning and language. Brain functions. Exploring the Mind: An Interdisciplinary Approach to Understanding the Higher Functions of the Human Brain

EDUCATION ACTIVITIES

In this course, active methodologies will be used focused on promoting students' autonomy and self-regulation, and on improving the achievement of the proposed learning outcomes.

To this end, 1) presentations of the theoretical and practical contents will be made by the teachers both asynchronously (through videos or documents) and through class presentations, and 2) student work activities, individually or in groups, during classes and in their autonomous work time, but always guided and monitored by the teachers. Classes will be held in person (3/4) and asynchronously (1/4).

The methodologies and tools used ensure learning in any of the possible scenarios, face-to-face, hybrid or online. The methodology and tools used are as follows:

1. Expository classes by teachers during face-to-face and remote classes. Digital tools will be used to facilitate student participation through their mobile phone or computer.
2. Carrying out exercises, activities and tasks (questionnaires, clinical cases, problems, making concept maps, infographics or videos,...) during classes individually or in cooperative groups.
3. Independent individual or group student work, through learning itineraries guided by teachers in Canvas or through other digital tools. Self-employment includes viewing and studying videos, reading scientific documents or articles, carrying out questionnaires, exercises or problems, making infographics, presentations or videos.
4. Formative evaluation through peer evaluation, self-evaluation and group co-evaluation, to be carried out both in person and during independent work. At all times, the activities that will be qualified will be indicated.
5. Laboratory practices and practical seminars. There will be 3 sessions in the laboratory during which techniques and methodologies specific to experimentation in physiology will be used, and 4 seminars that will complete the acquisition of the competency skills pursued in this subject.

DISTRIBUTION OF WORK TIME

TEACHER-LED TRAINING ACTIVITIES	INDIVIDUAL WORK
100 Horas	150 Horas

LEARNING RESULTS

Know the physiology of the skin, blood, circulatory, digestive, locomotor, reproductive, excretory and respiratory systems and systems, endocrine system, immune system and central and peripheral nervous system.

Know the mechanisms of homeostasis and adaptation to the body's environment.

To know the changes in cellular and systemic physiology that take place in the most prevalent diseases in our society.

Know the basic morphological, metabolic, physiological and genetic characteristics of both prokaryotic and eukaryotic living organisms, taking into account their morphological and functional unit.

SPECIFIC LEARNING RESULTS

Identify the cell types, molecules and processes involved in the mechanisms of function and regulation that occur in the human body||Distinguish and explain the physiological mechanisms that maintain the homeostasis of the different conditions of the internal environment.

Predict the consequences caused by variations in the conditions of the internal environment on the human being.

Argue about the role of biological processes in the human condition itself, in its behaviors, emotions and thoughts.

Use appropriate experimental techniques correctly to perform basic physiological measurements and evaluate the results obtained.

Correctly calculate essential physiological parameters and evaluate the result based on normality.

Integrate skills and knowledge acquired in other disciplines to the learning of physiology.

LEARNING APPRAISAL SYSTEM

- Evaluation of the theoretical content of the subject through oral or written tests (65%).

There will be partial exams, which will not release subject matter, and a final exam. The score of the partial exams will amount to 1/4 of the grade due to exams and that of the final exam the remaining 3/4. It will be necessary to get a 5 in the overall exam score to average the rest of the grades in the subject.

If the ordinary call is suspended, the partial notes may be kept until the extraordinary call. The student may waive the partial grades in either of the two calls, in which case the final exam score will represent the total exam score.

- Evaluation of the practical work carried out in the laboratory and seminars (20%). The ability to interpret the results obtained in the laboratory and in the seminars will be evaluated by means of an exam. Internship attendance will be mandatory and essential to be able to measure the rest of the grades in the subject.
- Participation in face-to-face classroom activities (10%). The resolution of exercises, the analysis of clinical cases, the creation of conceptual maps or infographics, and the presentation of results will be evaluated.
- Evaluation of exercises and practical cases (5%). Some of the activities will be qualified as an element of continuous evaluation.

If you have not passed the subject in the first call, the grades of the approved parts will be saved until the

extraordinary call. Students with exemption from the principal and repeat students who have not opted for the primary evaluation system will have an alternative evaluation system that will consist of taking a final exam (85%) and delivering tasks (exercises, analysis of practical cases, interpretation of scientific articles, creation of conceptual maps or infographics) through the virtual classroom (15%).

Plagiarism, as well as the use of illegitimate means in evaluation tests, will be sanctioned in accordance with those established in the Evaluation Regulations and the University's Coexistence Regulations.

ETHICAL AND RESPONSIBLE USE OF ARTIFICIAL INTELLIGENCE

1.- The use of any Artificial Intelligence (AI) system or service shall be determined by the lecturer, and may only be used in the manner and under the conditions indicated by them. In all cases, its use must comply with the following principles:

- a) The use of AI systems or services must be accompanied by critical reflection on the part of the student regarding their impact and/or limitations in the development of the assigned task or project.
- b) The selection of AI systems or services must be justified, explaining their advantages over other tools or methods of obtaining information. The chosen model and the version of AI used must be described in as much detail as possible.
- c) The student must appropriately cite the use of AI systems or services, specifying the parts of the work where they were used and describing the creative process followed. The use of citation formats and usage examples may be consulted on the Library website(https://www.ufv.es/gestion-de-la-informacion_biblioteca/).
- d) The results obtained through AI systems or services must always be verified. As the author, the student is responsible for their work and for the legitimacy of the sources used.

2.- In all cases, the use of AI systems or services must always respect the principles of responsible and ethical use upheld by the university, as outlined in the [Guide for the Responsible Use of Artificial Intelligence in Studies at UFV](#). Additionally, the lecturer may request other types of individual commitments from the student when deemed necessary.

3.- Without prejudice to the above, in cases of doubt regarding the ethical and responsible use of any AI system or service, the lecturer may require an oral presentation of any assignment or partial submission. This oral evaluation shall take precedence over any other form of assessment outlined in the Teaching Guide. In this oral defense, the student must demonstrate knowledge of the subject, justify their decisions, and explain the development of their work.

BIBLIOGRAPHY AND OTHER RESOURCES

Basic

Dee Unglaub Silverthorn; with the participation of William C. Ober (illustration coordinator); Claire W. Garrison, illustrator; Andrew C. Silverthorn, clinical advisor. Human Physiology: An Integrated Approach/4th ed. Buenos Aires: Pan-American Medicine, 2009.

Arthur C. Guyton, John E. Hall. Treatise on medical physiology/11th ed. Madrid:Elsevier, 2010.

(Arthur C. Guyton, John E. Hall. Treatise on medical physiology/11th ed. Madrid:Elsevier, 2010. , ||Walter F. Boron, Emile L. Boulpaep. Medical Physiology/3rd ed. Barcelona: Elsevier, 2017.)

Additional

'Master' evo 6: atlas and text with embryology, physiology, anatomical definitions, clinical and pathological conditions, radiological imaging. Madrid: Marbán, 2013.

('Master' evo 6: atlas and text with embryology, physiology, anatomical definitions, clinical and pathological

conditions, radiological imaging. Madrid: Marbán, 2013. , ||Susan E. Mulroney, Adam K. Myers. Netter: Foundations of Physiology/2nd ed. Barcelona: Elsevier, 2016.)