

| Degree programme | Type | Course |
|------------------|------|--------|
| Biology          | OB   | 2      |

## Contact lecturer

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## Teaching staff

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Anna Escrig

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## Group languages

You can consult this information at the [end](#) of the document.

## Prerequisites

- It is desirable that students have acquired basic knowledge and competences on the structure and organization of animal organisms and their cellular systems.
- It is important that students have acquired the basic knowledge and skills of the Histology and the Biochemistry course
- ***In order to be able to attend the sessions of laboratory practices, students must justify having passed the biosafety and security tests available in the Virtual Campus and be knowledgeable and accept the rules of operation of the laboratories of the Faculty of Biosciences.***

## Objectives

The subject *Physiology Animal I: Systems* is programmed during the second course of the Degree of Biology and develops the knowledge of the normal function of the following systems of the animal organism: blood and hematopoietic organs, cardiovascular system, respiratory system, digestive system, metabolism and Regulation of body temperature systems and excretory system and body fluids regulation.

The acquisition of the basic competences of the subject will allow students to confront with a sufficient base the study of Animal Physiology II: neurophysiology and endocrinology as well as the understanding of the mechanisms that have been chosen evolutionarily in the different animal groups for its effectiveness.

The general training objectives of the subject are:

- Learn the basics of Physiology of the different functional systems of the animal organism.
- Acquire a complete and integrated vision of the interrelations of the different systems in the organism.
- To integrate the knowledge of Physiology with those acquired in other basic subjects, which deal with the structure and the cellular and molecular aspects of the organism, in order to achieve a global vision of the functioning of the animal body.
- To train students to apply the physiological knowledge in the deduction of the consequences of the pathological alterations of the organism.
- Acquire the practical skills needed to carry out functional study techniques.

## Learning outcomes

- CM21 (Evaluate inequalities for reasons of sex and gender at the experimental level in the field of animal physiology and pharmacology, highlighting the possible biases derived from them.) Evaluate inequalities for reasons of sex and gender at the experimental level in the field of animal physiology and pharmacology, highlighting the possible biases derived from them.
- KM35 (Define electrical phenomena and signal transmission in excitable cells, the concept of homeostasis and the functional organisation of animal organs and systems and the neurobiological substrate that regulates behaviour in animals and humans.) Define electrical phenomena and signal transmission in excitable cells, the concept of homeostasis and the functional organisation of animal organs and systems and the neurobiological substrate that regulates behaviour in animals and humans.
- KM36 (Describe the function and regulatory mechanisms of the cardiovascular, respiratory, digestive, excretory, reproductive, nervous and endocrine systems of animals, with special emphasis on humans.) Describe the function and regulatory mechanisms of the cardiovascular, respiratory, digestive, excretory, reproductive, nervous and endocrine systems of animals, with special emphasis on humans.
- SM35 (Apply the rules of good laboratory practice to animal physiology and pharmacology studies.) Apply the rules of good laboratory practice to animal physiology and pharmacology studies.

## Contents

### THEORETICAL CLASSES

- General concepts. Internal environment and homeostasis. Mechanisms of intercellular communication.
- Nerve conduction. Excitability: ion channels, resting membrane potential, and action potential.
- Autonomic nervous system (ANS). General characteristics, sympathetic and parasympathetic ANS.
- Muscle physiology. Anatomical and functional characteristics of muscle tissues. Skeletal muscle: motor unit, muscle tone, isotonic and isometric contraction, energetics of contraction, types of skeletal muscle fibers. Smooth muscle and cardiac muscle.
- Hematopoiesis and hemostasis. General functions and physicochemical characteristics of blood. Functional components: plasma and cellular elements. Characteristics and functions of erythrocytes. Formation and functional characteristics of leukocytes. Inflammation. Hemostasis: phases and elements.
- Cardiovascular system. Functional organization and evolution of the circulatory system. Functional characteristics, excitability, and conductivity of the myocardium. Cardiac cycle and regulatory mechanisms. Arterial, venous, and lymphatic systems. Regulation of blood pressure.
- Respiratory system. Ecophysiology of respiration. Functional organization of the respiratory system. The mammalian lung. Mechanics of ventilation. Lung volumes and capacities. The respiratory membrane. Gas exchange in the alveolus and tissues. Regulation of respiration in mammals.
- Metabolism and thermoregulation. Energy balance and regulation of metabolic rate. Integration of metabolic functions of the organism: the liver as a metabolic organ in feeding/fasting cycles. Poikilothermy and homeothermy. Mechanisms of body temperature regulation. Animal adaptations to extreme temperatures. Hyperthermia and fever. Hypothermia and freezing.
- Digestive system. Components and functions of the digestive system. Enteric nervous system. Gastrointestinal secretions. Structure and functional regulation of the stomach. Functional structure of

the small intestine: digestion and nutrient absorption. Functional structure of the large intestine: intestinal secretion and absorption. Regulation of food intake in the short and long term.

- Excretory system. Volume and composition of body fluids. Excretion of nitrogenous products. Functional structure of the kidney: the nephron as a functional unit, glomerular filtration, tubular secretion, and reabsorption. Glomerular hemodynamics. Regulation of tubular reabsorption and secretion. Mechanisms of urine concentration: proximal tubule, loop of Henle, distal tubule and collecting duct. Regulation of the volume and osmolarity of body fluids. Animal adaptations to water stress conditions. Regulation of acid-base balance.

#### LABORATORY PRACTICAL CLASSES

- Electrocardiographic (ECG) recording. Evaluation of a normal ECG. Variations due to body position, local cold, and apnea.
- Cardiorespiratory adaptations to exercise. Heart rate and blood pressure. Evaluation of the effects of static and dynamic exercise.
- Functional anatomy of the rat. Dissection and identification of organs and systems (necropsy). Determination of absolute and relative organ weights.

#### CLASSROOM PRACTICES

Specific case studies of ecophysiological adaptations related to the different physiological systems studied in the theoretical classes will be presented and evaluated in groups.

#### Learning activities and methodology

| Title                                             | Hours | ECTS | Learning outcomes |
|---------------------------------------------------|-------|------|-------------------|
| Solving cases and problems                        | 8     | 0.32 | KM35, KM36        |
| Elaboration of works                              | 4     | 0.16 | KM35, KM36        |
| Laboratory practices                              | 12    | 0.48 | KM36, SM35        |
| theoretical expositions                           | 32    | 1.28 | KM35, KM36        |
| Preparation of laboratory and classroom practices | 4     | 0.16 | KM36, SM35        |
| Study                                             | 60    | 2.4  | KM35, KM36        |
| Solving cases and problems                        | 12    | 0.48 | KM36, SM35        |
| Solving problems and cases in the classroom       | 6     | 0.24 | KM35, KM36        |

#### Theoretical classes:

Systematized presentation of the subject's program, giving relevance to the most important concepts. Students acquire the basic scientific knowledge of the subject by attending theory classes that will be complemented with the personal study of the exposed topics.

#### Classroom practices:

Work on cases and/or problems relevant to learning the subject. The knowledge acquired in theory classes and personal study is applied to the resolution of practical cases that arise. Students work in groups.

#### Laboratory course:

Practice sessions for the observation and performance of procedures, practical learning of physiological techniques. Group work and active self-learning are promoted.

In order to attend the laboratory practice sessions, students must prove that they have passed the biosafety and safety tests available on the Virtual Campus and be familiar with and accept the operating standards of the laboratories of the Faculty of Biosciences.

#### Tutorials:

Individual sessions or in small groups to resolve doubts related to the subject. This type of activity will be carried out at the request of students (individually or in groups) or will be proposed by the teacher on a voluntary basis. Therefore, it is an activity that will not be valued in the count of hours included in this teaching guide.

Annotation: within the schedule set by the centre or degree programme, 15 minutes of one class will be reserved for students to evaluate their lecturers and their courses or modules through questionnaires.

## Assessment

### Continuous assessment activities

| Title                               | Weight | Hours | ECTS | Learning outcomes      |
|-------------------------------------|--------|-------|------|------------------------|
| Examination of theoretical concepts | 75%    | 8     | 0.32 | KM35, KM36             |
| Evaluation of laboratory practices  | 10%    | 2     | 0.08 | CM21, KM35, KM36, SM35 |
| Evaluation of classroom practices   | 15%    | 2     | 0.08 | KM35, KM36             |

#### Assessment:

- Evaluation of practical competences acquired through the resolution of problems and theoretical exam questions. Asses
- Evaluation of theoretical competences by means of objective tests of multiple answer and short questions. It is indispensable to get a grade equal to or greater than 5 to consider the partial part of theoretical knowledge achieved.
- Evaluation of problems based on the results in the case of the problems and the capacity of synthesis and brief explanation in the resolution of questions posed.
- Possibility of recovering only those parts of the theoretical competences that were not obtained at the time.
- The modification of the overall grade of the subject can be done by means of the resolution of a synthesis examination (one question) of the entire subject, which implies the renunciation of the previous note
- Repeaters that do not carry out a continuous assessment, that is to say, do not face problems and / or practice sessions must notify the teaching staff at the beginning of the course, the others will have to do the continuous assessment just like the other classmates, they will have to carry out the practice exam and the mark of the subject will be calculated as 85% theoretical concepts and 15% practical.

To participate in the recovery, the students must have previously been evaluated in a set of activities whose weight equals to a minimum of two thirds of the total grade of the subject or module. Therefore, students will obtain the "Non-Appraising" qualification when the assessment activities carried out have a weighting of less than 67% in the final grade.

Single assessment: The subject contemplates the single assessment. The practices are mandatory, they are 10% of the grade and will be evaluated through multiple choice questions on the same day as the theory exam. The theory represents 75% of the final mark and will be evaluated by means of a multiple-choice test (it is essential to get a mark equal to or higher than 5 to consider the partial part of theoretical knowledge achieved). The evaluation of practical problems in the classroom is 15% of the grade and will be evaluated through short

questions on the same day of the theoretical and practical exam. The same recovery system as for the continuous evaluation will be applied. The revision of the final qualification follows the same procedure as for the continuous evaluation.

In this course, the use of Artificial Intelligence (AI) technologies is not allowed in any of its phases. Any work that includes fragments generated by AI will be considered a breach of academic honesty and may result in a partial or total penalty on the activity grade, or more severe sanctions in serious cases.

Any irregularity committed during an assessment activity (academic misconduct, plagiarism, or improper use of AI, unless such use is expressly authorized in the course syllabus) that may lead to a significant alteration of the grade will result in that activity being graded as 0. If the course syllabus stipulates that obtaining a minimum mark in this assessment is an essential requirement to pass the course, or if multiple irregularities occur in the assessment activities of the same course, the final grade for the course will be 0. Furthermore, disciplinary proceedings may be initiated against any student who incurs any of these irregularities.

## Bibliography

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- Pocock, G., Richards, C. D., & Richards, D. A. (2018). *Human physiology* (5th ed.). Oxford University Press.
- Widmaier, E. P., Raff, H., & Strang, K. T. (2023). *Vander's human physiology: the mechanisms of body function* (16th ed.). McGraw-Hill Education.

## Software

No specific software is needed.

## Course groups and languages

The information provided is provisional until November 30. After this date, you will be able to consult the language of each group through this [link](#). To access the information, you will need to enter the course CODE

| Type of teaching           | Group | Language | Semester        | Shift         |
|----------------------------|-------|----------|-----------------|---------------|
| (TE) Theory                | 12    | Catalan  | second semester | afternoon     |
| (PAUL) Classroom practices | 121   | Catalan  | second semester | morning-mixed |

|                                               |     |         |                 |               |
|-----------------------------------------------|-----|---------|-----------------|---------------|
| (PLAB) Practical laboratories                 | 121 | Catalan | second semester | morning-mixed |
| (PLABs) Suport a les pràctiques de laboratori | 121 | Catalan | second semester | morning-mixed |
| (PAUL) Classroom practices                    | 122 | Catalan | second semester | morning-mixed |
| (PLAB) Practical laboratories                 | 122 | Catalan | second semester | morning-mixed |
| (PLABs) Suport a les pràctiques de laboratori | 122 | Catalan | second semester | morning-mixed |
| (PLAB) Practical laboratories                 | 123 | Catalan | second semester | morning-mixed |
| (PLABs) Suport a les pràctiques de laboratori | 123 | Catalan | second semester | morning-mixed |
| (PLAB) Practical laboratories                 | 124 | Catalan | second semester | morning-mixed |
| (PLABs) Suport a les pràctiques de laboratori | 124 | Catalan | second semester | morning-mixed |