COURSE DATA

Data Subject	
Code	33169
Name	Animal biology
Cycle	Grade
ECTS Credits	6.0
Academic year	2023 - 2024

Study (s)

Degree	Center	Acad. year	Period
1102 - Degree in Biotechnology	Faculty of Biological Sciences	2	First term

Subject-matter

Degree	Subject-matter	Character
1102 - Degree in Biotechnology	81 - Foundations of functional biology	Obligatory

Coordination

Name	Department
FERRANDO RODRIGO, DOLORES	357 - Cellular Biology, Functional Biology and Physical Anthropol.
SANCHO AGUILAR, ENCARNACION	357 - Cellular Biology, Functional Biology and Physical Anthropol.

SUMMARY

In the Degree in Biotechnology of the University of Valencia, the Animal Biology course is mandatory and is situated in the first quarter of the second year, with a size of 6 credits. Fundamentals belongs to the field of Functional Biology within the module Fundamentals of Biology. This module aims to provide the biological basis necessary for the student to progress in the knowledge of biotechnology. Matter Biology will provide the student a transversal view of modern biology including the biology of organisms and systems from biological diversity. Fundamentals matter of Functional Biology must complete the biological formation from coming to the functioning of different types of organisms levels and, therefore, the subject will deal primarily Animal Biology study the functioning of animals.

PREVIOUS KNOWLEDGE

Relationship to other subjects of the same degree

There are no specified enrollment restrictions with other subjects of the curriculum.

Other requirements

This is a subject of synthesis, in which the student must understand the functional relationships between the different parts of the animal as well as coordination between them, and which are necessary for the animal to function as a whole. This requires the student has acquired minimum basic knowledge of physics, chemistry, biochemistry, histology and cytology and Animal zoology at the undergraduate level.

OUTCOMES

1102 - Degree in Biotechnology

- Ser capaz de dar una breve charla a un auditorio no especializado sobre un tema general de Biología con impacto actual en la sociedad.
- Aprender a trabajar de forma adecuada en un laboratorio con material biológico (microorganismos, plantas y animales) incluyendo seguridad, manipulación y eliminación de residuos biológicos, y con registro anotado de actividades.

LEARNING OUTCOMES

Get an integrated view of the functioning of the animal and be able to relate and apply their knowledge.Acquire synthesis capacity to collect, organized and coherent information or data from various sources.Knowing, even in passing, the management of own basic scientific instrumentation (materials and instruments) of the Animal Biology.Acquire sufficient skill in handling laboratory animals and be able to obtain, prepare and manage materials and samples of animal origin and physiological interest.Ability to work together when facing problematic situations collectively.Capacity for speaking to a public audience, such as the class itself, through exposure or intervention in a debate on a controversial topic or issue.

DESCRIPTION OF CONTENTS

1. THEORETICAL CLASSES

Lesson 1.- Introduction to Physiology. Concept of Animal Physiology. The integrative nature of animal physiology. Functional compartments of the organism: Internal Environment and Homeostasis. Communication and integration: negative feedback regulation and non-homoeostatic regulatory changes. Organisation of regulatory systems.
Lesson 2.- Energy flow through the animal.- Sources and distribution of energy: biosynthesis, maintenance and external work.- Metabolic rate.- Factors affecting metabolic rate.
Lesson 3.- Temperature and heat - Heat transfer between animals and their environment: conduction, convection and evaporation - Thermal relationships - Endothermy and thermoregulation: poikilothermy

and homeothermy.
Lesson 4.- Neurons and neuronal networks Electrical signals in neurons: graded and action potentials. Nerve impulse conduction. Synapses.
Lesson 5.- Organisation of the nervous system. Evolution. Functional divisions of the vertebrate nervous system. Central nervous system. Efferent nervous system: autonomic and somatic.
Lesson 6.- Sensory Physiology. Functional organisation and general properties. Models of mechanoreception and photoreception in vertebrates and invertebrates.
Lesson 7.- Cardiovascular physiology. Circulation: Concept, necessity and functions. The vertebrate heart. Origin of the heartbeat. Electrical activity of the heart. Cardiac cycle. Circulation in invertebrates. Blood flow and blood pressure. Capillary-tissue exchange.
Lesson 8.- Respiratory physiology. Respiration. General concepts. Respiratory system in mammals: the lung. Respiratory system in other vertebrates: fish. Respiratory system in invertebrates. Control of ventilation.
Lesson 9.- Gas exchange and transport. Respiratory gas transport. Haemoglobins and other respiratory pigments. Factors affecting gas transport.

2. THEORETICAL CLASSES

Lesson 10.- Water-electrolyte balance. Osmoregulation. Osmoregulation in terrestrial environments (humid and xeric animals). Osmoregulation in aquatic environments.
Lesson 11.- Excretion and renal function. Overview of renal function in mammals. The nephron. Excretory system in invertebrates.
Lesson 12.- Concept of nutrition, feeding and digestion.- Symbiosis with microorganisms plays a central role in the feeding and nutrition of animals.- Ruminant mammals as an example of fermenters.
Lesson 13.- Digestive functions and processes. Vertebrates, arthropods and molluscs represent three modes of digestion and absorption. Gastrointestinal motility. Digestive secretions. Digestion and absorption. Regulation of gastrointestinal function.
Lesson 14.- Endocrine and neuroendocrine physiology: control of endocrine systems: the vertebrate pituitary gland.
Lesson 15.- Types of reproduction: asexual and sexual. Internal and external fertilisation. Reproduction in mammals. Regulation of ovarian and testicular function. Fertilisation, implantation, parturition and lactation.
Lesson 16.- Assisted reproduction techniques. Artificial insemination. In vitro" embryo production. Conservation and manipulation of gametes and embryos.

3. LABORATORY AND SIMULATION PRACTICAL EXERCISES

Laboratory exercises

Effect of temperature on the oxygen consumption of aquatic animals.
Absorption spectrum of haemoglobin depending on its degree of saturation with oxygen.

Study of the effect of juvenile hormone treatment on insect larvae / nymphs.
Effect of temperature on heartbeat in Daphnia.
Salinity and volume regulation in polychaete worms.

Study of sensory receptors in humans.
Electromyography (BIOPAC Student System). Electrocardiography.
Human blood pressure study.
Spirometry Analysis of lung volumes and capacities.
In situ observation of chloride cells in Artemia.
Study of the estrous cycle in the albino mouse

Simulation exercises

Computer simulation of various physiological processes related to the endocrine system (metabolism and hormones).
Computer simulation of various physiological processes related to the muscular system. Skeletal muscle physiology.
Computer simulation of various physiological processes related to the circulatory system. Frog cardiovascular physiology.
Computer simulation of various physiological processes related to the circulatory system. Cardiovascular dynamics.
Computer simulation of various physiological processes related to the respiratory system. Mechanisms of the respiratory system.
Computer simulation of various physiological processes related to the digestive system. Physical and chemical processes of digestion.
Computer simulation of various physiological processes related to the excretory system. Renal physiology.
Computer simulation of various physiological processes related to the nervous system. Neuro-physiology of nerve impulses.

4. TUTORIALS AND PROBLEMS IN THE CLASSROOM

A total of 3 sessions of tutorials and problems in the classroom lasting 2 hours will be planned and in them they will raise and solve cases and problems related to the subject

WORKLOAD

ACTIVITY	Hours	% To be attended
Theory classes	32,00	100
Laboratory practices	21,00	100
Classroom practices	5,00	100
Tutorials	2,00	100
Development of individual work	20,00	0
Study and independent work	30,00	0
Preparing lectures	20,00	0
Preparation of practical classes and problem	3,00	0
Resolution of case studies	14,00	0
Resolution of online questionnaires	3,00	0
TOTAL	**150,00**	

TEACHING METHODOLOGY

The teaching methodologies of the different activities (face-to-face and non-face-to-face) are described here.

Theory classes, of a masterly type, will be taught sequentially throughout the academic year, so that they are integrated with the rest of the proposed activities.

Practical laboratory and simulation classes. The total face-to-face laboratory hours are divided into 6 sessions of three hours each. In each session the students, in pairs, carry out the proposed activities after having read the instructions previously provided. It is necessary to attend at least 70% of the face-to-face laboratory classes in order to take the practical exam. The practical simulation classes will be carried out in person or in parallel with the laboratory practices. Computer simulations based on PhysioEx 9.0 software for Human Physiology will be proposed (see bibliography). If possible, 1 face-to-face session will be reserved at the beginning of the course to explain the importance of simulation in physiology and show how PhysioEx 9 works.

Classroom problems. They will be carried out in the classroom with small groups in 2 sessions lasting 2 hours. Activities (multimedia materials, questionnaires ...) will be proposed to delve into certain topics of general interest to students. These subjects are susceptible of being evaluated in the theoretical evaluation tests.

In the **2-hour tutorial session**, once the theory classes are finished, interactive activities (individual or group) will be proposed to help consolidate the subject's competences. These activities are capable of being evaluated in the theoretical evaluation tests.

EVALUATION

Theory evaluation.

In the first call, only the theory of the subject will be approved by means of continuous assessment. There will be two tests with multiple choice questions. The evaluation of these questions will be added to the short questions that will be carried out at the end of the semester, on the reserved date

Evaluation of the practices.

In the first call, a practical laboratory examination will be carried out with the resolution of two practical cases "in situ". In parallel, a test questionnaire will be carried out with questions corresponding to the laboratory sessions and the simulation practices.

The distribution over a maximum of 100 points will be as follows (50 POINTS MUST BE REACHED TO PASS THE SUBJECT):

THEORY (60%)(Continuous assessment)

Short questions	**30 points**
Test questionnaires	**30 points**

PRACTICES 30%

Practical cases	**15 points**
Laboratory practice simulation questionnaire	**15 points**

CONTINUOUS EVALUATION ACTIVITIES 25%

Assistance and use of tutoring and problems	**10 points**

TOTAL **100 POINTS**

Particular conditions

In order to pass the course, it is a necessary condition to pass both theory and practice. Only in this case will the grades obtained in the rest of the activities be added. In case of not reaching the minimum score in one of the two parts (theory or practice), the score of the other may be saved during a full academic year. The marks corresponding to the continuous assessment activities (tutorials, classroom problems ...) will also be saved.

The second call for the theoretical part will consist of a single exam with multiple choice questions and reasoning questions. The continuous evaluation of the theoretical part has no value in this call.

In the second call, the practical exam will be similar to that of the first call.

REFERENCES

Basic

- Silverthorn, D.E. (2019) Fisiología Humana. Un enfoque integrado. 8ed. Editorial Médica Panamericana. Madrid (Disponible on line Universitat de València)
Fox, S.I (2013). Fisiología Humana. 13ª Edición. Mc Graw Hill. Madrid.
Sherwood, L (2016) Human Physiology: From Cells to Systems, 9th Edition. Brooks/Cole Cengage Learning.
Koeppen, BM y Stanton, B.A. (Eds) (2009). Berne y Levy Fisiologia. 6ª Edición. Elsevier España, Barcelona.
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Zao, P., Stabler, T., Smith, L., Lokuta, A., Griff, E. (2012) PhysioEx 9.0. Simulaciones de laboratorio de Fisiología. Pearson Eduación. S.A. Madrid.

Additional

- Ganong, W.F. (2013). Fisiología médica. 24ª Edición. Mc Graw Hill. Madrid
- Guyton, A.C. (2016). Tratado de fisiología médica. 13ª Edición. Elsevier.
- Hill, R.W., Wyse, G.A. y Anderson, M. (2016) Animal Physiology. 4th Edition. Sinauer Associates, Inc, Sunderland, Massachusetts
- Stanfield, C.L. (2011). Principios de Fisiología Humana. 4th Edition. Addison Wesley (Pearson). Madrid
- Widmaier, E.P., Raff, H, Strang K.T. (2014). Vanders Human Physiology. The Mechanisms of Body Function. 13th Edition. Mc Graw Hill.