COURSE DATA

DATA SUBJECT

Code: 33169
Name: Animal biology
Cycle: Undergraduate Studies
ECTS Credits: 6
Academic year: 2025-26

STUDY (S)

Degree	Center	Acad. year	Period
1111 - Grado en Biotecnología	Facultat de Ciències Biològiques	2	First quarter

SUBJECT-MATTER

Degree	Subject-matter	Character
1111 - Grado en Biotecnología	Foundations of functional biology	COMPULSORY

COORDINATION

SANCHO AGUILAR ENCARNACION

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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

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.

COMPETENCES / LEARNING OUTCOMES

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Actuar con autonomía en el aprendizaje, tomando decisiones fundamentadas en diferentes contextos, emitiendo juicios en base a la experimentación y el análisis y transfiriendo el conocimiento a nuevas situaciones

Adquirir, desarrollar y aplicar las principales técnicas de preparación, tinción y observación de muestras biológicas

Apply analytical, synthetic and critical thinking skills in the application of the scientific method.

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.

Colaborar eficazmente en equipos de trabajo, asumiendo responsabilidades y funciones de liderazgo y contribuyendo a la mejora y desarrollo colectivo

Conocer la composición, formación y función de cada compartimento celular y de los diferentes tejidos

Conocer y comprender, desde el propio ámbito de la titulación, las desigualdades por razón de sexo y género en la sociedad; integrar las diferentes necesidades y preferencias por razón de sexo y de género en el diseño de soluciones y resolución de problemas

Contribuir en el diseño, desarrollo y ejecución de soluciones que den respuesta a demandas sociales, teniendo en cuenta como referente los Objetivos de Desarrollo Sostenible

Demostrar razonamiento crítico y autocrítico en el ámbito de la titulación, considerando aspectos tales como la ética profesional, los valores morales y las implicaciones sociales de las diferentes actividades realizadas

Disseminate and engage in public debate on issues related to biotechnology and its applications.

Participate in multidisciplinary teams, engaging in teamwork and collaboration.

Propose creative and innovative solutions to complex situations or problems, typical of the area of ¿¿¿¿connection, to donate responses to the various professional and social needs

Que el estudiantado demuestre su capacidad para reconocer la diversidad biológica y conocer la organización de los seres vivos y la ubicación del ser humano y de los organismos modelo en experimentación biotecnológica en dicha diversidad

Que el estudiantado demuestre su capacidad para utilizar las diferentes fuentes bibliográficas y bases de datos biológicos y usar las herramientas bioinformáticas

Saber comunicarse de manera efectiva, tanto de forma oral como escrita, adaptándose a las características de la situación y de la audiencia

Ser capaz de dar una breve charla a un auditorio no especializado sobre un tema general de Biología con impacto actual en la sociedad.

Ser capaz de observar e interpretar los resultados obtenidos a través de microscopios ópticos

Ser capaz de situar los distintos seres vivos en el árbol filogenético

Understand evolutionary relationships among organisms.

Understand the biological foundations of human diversity and its cultural implications, including gender differences.

Use English to write reports and to interpret information from protocols, manuals and databases.

Work in laboratories, including safety procedures, waste management and accurate activity logging.

DESCRIPTION OF CONTENTS

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. Organization 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.- Organization 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 organization 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. Hemoglobin and other respiratory pigments. Factors affecting gas transport.

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 mollusks 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 fertilization. Reproduction in mammals. Regulation of ovarian and testicular function. Fertilization, implantation, parturition and lactation.

Lesson 16.- Assisted reproduction techniques. Artificial insemination. In vitro" embryo production. Conservation and manipulation of gametes and embryos.

Laboratory exercises

-Effect of temperature on the oxygen consumption of aquatic animals.

-Absorption spectrum of hemoglobin 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 polychaeta 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.

-Anatomical-functional study of the vertebrate heart

WORKLOAD

PRESENCIAL ACTIVITIES

Activity	Hours
Tutorials	2,00
Theory	36,00
Laboratory	18,00
Classroom practices	4,00
Total hours	**60,00**

NON PRESENCIAL ACTIVITIES

Activity	Hours
Attendance at other activities	0,00
Individual or group project	20,00
Independent study and work	30,00
Preparation of lessons	23,00
Preparation for assessment activities	3,00
Resolution of case studies	14,00
Total hours	**90,00**

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.

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.

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	20 points
Laboratory practice questionnaire	10 points

CONTINUOUS EVALUATION ACTIVITIES 10%

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

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Widmaier, E.P., Raff, H., Strang, K.T. (2019). Vanders Human Physiology 15th Edition. Mac Graw Hill. New York

Hill, R.W.; Cavanaugh, D.J. and Anderson, M. Animal physiol. 5th ed. (2021) Sinauer Ass. Inc. Sunderland, Massachusetts

Moyes, D.C.; Schulte, P.M. 2016. Principles of Animal Physiol. 3rd Ed. 2016. Ed Pearson, Toronto, Canada

Sherwood, L (2013) Animal Biology, 2 Edition. Brooks/Cole Cengage Learning

Additional

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-Widmaier, E.P., Raff, H, Strang K.T. (2014). Vanders Human Physiology. The Mechanisms of Body Function. 13th Edition. Mc Graw Hill.