27104 - Physiology

Información del Plan Docente

Academic Year	2018/19
Subject	27104 - Physiology
Faculty / School	100 - Facultad de Ciencias
Degree	446 - Degree in Biotechnology
ECTS	6.0
Year	
Semester	Second semester
Subject Type	Basic Education
Module	

1.General information

1.1.Aims of the course

1.2.Context and importance of this course in the degree

1.3.Recommendations to take this course

2.Learning goals

2.1.Competences

2.2.Learning goals

2.3.Importance of learning goals

3.Assessment (1st and 2nd call)

3.1.Assessment tasks (description of tasks, marking system and assessment criteria)

4.Methodology, learning tasks, syllabus and resources

4.1.Methodological overview

The methodology followed in this course is oriented towards the achievement of the learning objectives. The learning process designed for this course follows an orderly step-wise process, so that the course starts with the study of basic and integration concepts which are mainly worked through **lectures**, then it introduces the student to develop skills involving procedural, integration and understanding skills of the applications of the subject to be worked through various activities in small groups in **practice sessions**.

To better track the learning process students will be encouraged to use the **tutoring/office hours** through various systems and methods: conventional tutoring or more specific assistance related to practical work.

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Communications, announcements, and supplementary materials will be provided via Moodle in the **Anillo Digital Docente** (intranet ADD).

4.2.Learning tasks

The course includes the following learning tasks:

- Participatory lectures: basic concepts of the subject are showed, directing students towards the acquisition of skills and learning outcomes. Audiovisual support material will be used and students could find it in the intranet ADD. During these activities, students will be encouraged to be participatory and dynamic. This activity occupies 4 ECTS, 40 hours in the lecture room.
- Practice sessions occupying 2 ECTS, 20 hours spread over six sessions of 3 or 4 hours including:
  - a) Laboratory sessions: students will have the opportunity to perform functional examinations of the main physiological parameters on animal or human samples. All students will be informed about the risks that may have the realization of the practices of this subject, and if dangerous products are handled, and what to do in case of accident. To perform them is compulsory to sign a commitment to comply with lab standards and safety. It is the student's responsibility to be aware of all such issues and act in an extremely cautious manner to avoid any potential causes for accidents in the laboratory. For more information, see the information for students of the Occupational Health and Safety Unit: http://uprl.unizar.es/estudiantes.html
  - b) Physiology cases: the student should solve problems about cases of alteration or adaptation of function, in order to integrate and apply his theoretical knowledge.
  - c) Computer simulations: analysing physiological parameters under simulation and different experimental conditions, the student is able to understand how the different systems and organs are integrated and regulated. Before each session, students will have available the protocol of the practice. At the end of it, students submit to the teacher a laboratory assignment with answers to questions about the practice performed and the results obtained. Along with the degree of participation and teamwork done, this assignment will grade this part of the course.
- Tutorials: both individual and grouped, for guidance in the teaching-learning of the subject.
- Autonomous work: From all other activities, students should be responsible for creating diagrams and structured work programs.

4.3.Syllabus

The course will address the following topics:

I. INTRODUCTION TO THE PHYSIOLOGY

- 1- The concept of Physiology. Homeostasis. Internal environment and body fluids

II. PHYSIOLOGY OF THE NERVOUS SYSTEM

- 2- Physiology of excitable tissues. Membrane potential. Action potential. Conduction and transmission of nerve impulses. Synapses.
- 3- Sensitive functions. Sensory receptors. Receptors classification.
- 4- Chemoreception: olfactory and taste sensitivity.
- 5- Mechanoreception: Superficial tactile sensitivity. Proprioception. Hearing sensitivity. The vestibular system.
- 6- Thermoreception. Electroreception. Nociception. Photoreception.
- 7- Regulation of motor activity. Integration centers. Effector organs and nerve pathways.
- 8- Regulation of the vegetative functions. The autonomic nervous system.

III. INTERNAL ENVIRONMENT. BLOOD.

- 9- The general functions of blood. Components. Functions of erythrocytes and leukocytes.
- 10- Physiological hemostasis. Coagulation. Fibrinolysis. Anticoagulants.

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IV - SKELETAL MUSCLE PHYSIOLOGY

- 11- Skeletal muscle contraction

V. CARDIOVASCULAR PHYSIOLOGY.

- 12- General functions of the cardiovascular system.
- 13- Electrical and mechanical activity of the heart.
- 14- Regulation of cardiac activity.
- 15- Arterial pressure.
- 16- Microcirculation. Venous and lymphatic return.

VI. RENAL PHYSIOLOGY

- 17- Functions of the kidney. Urine formation.
- 18- Ultrafiltration and tubular function. Mechanisms of concentration and dilution of urine. Micturition.
- 19- Renal regulation of the volume and composition of extracellular fluid.
- 20- Regulation of acid-base balance.

VII. RESPIRATORY PHYSIOLOGY.

- 21- General functions of the respiratory system. Functions of the upper airways.
- 22- Mechanics of respiration.
- 23- Respiratory membrane. Transport of gases.
- 24- Regulation of respiration.

VIII. DIGESTIVE PHYSIOLOGY AND NUTRITION.

- 25- Introduction to digestive processes: motility, secretion, absorption and regulation.
- 26- Oral cavity functions.
- 27- Functions of the stomach.
- 28- Pancreas, liver and gallbladder functions.
- 29- Small and large intestine functions. Defecation.
- 30-. General principles of Nutrition and food intake control.

IX. ENDOCRINE SYSTEM PHYSIOLOGY

- 31- General mechanisms of the endocrine system.
- 32- Hypothalamic-pituitary axis.
- 33- Thyroid hormones.
- 34- Hormones of the endocrine pancreas.
- 35- Hormones of the adrenal gland.
- 36- Hormonal control of calcium-phosphate metabolism.

X. REPRODUCTIVE PHYSIOLOGY

- 37- General characteristics of the reproductive function. Types of reproduction and its regulation.
- 38- Reproductive physiology of the male.
- 39- Reproductive physiology of the female. Reproductive cycles.
- 40- Pregnancy, parturition and lactation.

LABORATORY SESSIONS:

- Session 1:
  - Count of erythrocytes and leukocytes
  - Leucocyte formula
  - Determination of hemoglobin and hematocrit value

- Session 2:
  - Physiology of skeletal muscle
  - Reflexes/ Neuronal
- Session 3:
  - The electrocardiogram (EKG)
  - Blood pressure and pulse measurement
- Session 4:
  - Urine analysis
  - Determination of blood glucose
- Session 5:
  - Spirometry
  - Handling of experimental animals
  - Study of vaginal smear of rats
- Session 6:
  - Integration: Physiology of exercise

4.4.Course planning and calendar

Schedules of lectures and problems will coincide with the officially established and will be available at: https://ciencias.unizar.es/grado-en-biotecnologia.

The places, calendar and groups for training and practical sessions will be established in coordination with the rest of subjects at the beginning of the course. The Coordinator will produce the groups of students for these activities at the beginning of course to avoid overlaps with other subjects.

The practices will be carried out in the laboratory of practices of Physiology of the Faculty of Veterinary (C/ Miguel Servet, 177) located at the main building or in the unit of Physiology of the Faculty of Medicine (C/ Domingo Miral s/n), first floor of the building A.

Students will be informed about any modification of the schedule through the Bulletin Board of the Course, located at the Faculty of Sciences. The same information will be placed in the ADD.

For students enrolled in the subject, places, times and dates of lectures and practical sessions will be public via Bulletin Board advertisements of the grade on the platform Moodle at the University of Zaragoza, https://moodle2.unizar.es/add/, and in the moodle page for the course. These routes will be also used to communicate enrolled students their distribution by groups of practical sessions, which will be organized by the coordination of degree. Provisional dates will be available on the website of the Faculty of Sciences in the corresponding section of the Degree in Biotechnology: https://ciencias.unizar.es/grado-en-biotecnologia. In this web there will be also available the dates of exams.

4.5.Bibliography and recommended resources