

## 30806 - General and nutritional physiology

### Información del Plan Docente

Academic Year	2017/18
Faculty / School	105 - Facultad de Veterinaria
Degree	568 - Degree in Food Science and Technology
ECTS	6.0
Year	1
Semester	Second semester
Subject Type	Basic Education
Module	---

### 1.General information

#### 1.1.Introduction

#### 1.2.Recommendations to take this course

#### 1.3.Context and importance of this course in the degree

#### 1.4.Activities and key dates

### 2.Learning goals

#### 2.1.Learning goals

#### 2.2.Importance of learning goals

### 3.Aims of the course and competences

#### 3.1.Aims of the course

#### 3.2.Competences

### 4.Assessment (1st and 2nd call)

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

### 5.Methodology, learning tasks, syllabus and resources

#### 5.1.Methodological overview

The learning process designed for this subject is based on the following:

**Theoretical classes:** Lectures (40 h), with the theoretical contents enumerated below, will be given in the classroom in 40 sessions of 50 min.

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**Practical classes:** They will be given in the Laboratory of Physiology or in the Computer classroom, in 8 sessions of 2 h (total: 16 h). Initially, the teacher will make a short explanation to the students. Then, the students will perform the practice. The obtained results will be analyzed and reasoned at the end of the practical session.

**Tutored projects:** Each student will prepare and submit a supervised work that will be shown in the classroom (its implementation will involve 25 h of student work). It will be performed in groups of 4-5 students. First, the teacher will make a presentation and orientation of the work to each student group. The professor will supervise, guide and resolve any questions about the material used to prepare the work presentation. Finally, the student groups will carry out the oral presentation of their work. They will attend the presentation of all other students that will take place in four seminars (4 h)

Teaching materials for the course (class presentations, laboratory protocols, recommended bibliography, web addresses) will be available in advance on the Digital Teaching Ring (ADD) of the University of Zaragoza and on the reprographic service of the Faculty of Veterinary Medicine of Zaragoza. This will allow the student to review the corresponding documents before a certain lecture or practical session, in order to encourage their participation in the development of a true participatory class or practice.

### 5.2.Learning tasks

**The program offered to the students to help them to achieve the expected results includes the following activities:**

The course is structured into 40 participatory lectures (40 h), 16 hours of laboratory or computer practices, and 4 hours of seminars. In addition, the student has to perform a work and present an oral report on a particular physiological process, or pathological or nutritional aspects related to this process. The seminars (4 h) correspond with the presentations performed by the students of these works.

The 40 lectures are divided into 7 thematic blocks. The eight practice sessions will be adjusted over time, where possible, to the concepts explained in the lectures. The tutored projects will also serve to reinforce and discuss part of physiological concepts explained throughout the course.

### 5.3.Syllabus

**A) Lectures** . Lectures are organized in 7 thematic blocks:

#### **I. Introduction and physiology of the nervous system (7 h).**

1. Concept of Physiology: Objectives and interest. Relationship with other sciences. Physiology in the Degree of Science and Food Technology.

2. Homeostasis. Transport through the cell membrane. Resting membrane potential. Action potential.

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3. Neuronal physiology: Synapse.
4. Skeletal muscle physiology. Excitation-contraction coupling.
5. Introduction to the physiology of the nervous system. Sensory receptors.
6. Motor activity. Spinal cord.
7. Autonomic nervous system. Sympathetic and parasympathetic system.

### II. Blood and cardiovascular physiology (6 h).

8. General properties and functions of blood. Erythrocyte physiology.
9. Physiology of leukocytes and platelets. Hemostasis.
10. Heart physiology. Cardiac electrophysiology.
11. Mechanical activity of the heart. Cardiac cycle.
12. Physiology of blood vessels. Systemic, capillary and lymphatic circulation.
13. Regulation of cardiac activity and peripheral circulation. Arterial blood pressure.

### III. Respiratory and renal physiology (6 h).

14. Breathing: pulmonary ventilation. Mechanics of breathing.
15. Gas exchange in the lungs and the tissues. Transport of respiratory gases.
16. Regulation of breathing. Nervous and chemical control.
17. Renal physiology. Glomerular filtration.
18. Tubular functions: reabsorption and secretion. Renal clearance. Urinary concentration and dilution.
19. Regulation of the volume and osmolarity of body fluids. Acid-base balance.

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### **IV. Physiology of the digestive system (9 h).**

20. Regulatory systems of gastrointestinal function.
21. Regulation of food intake: hunger-satiety.
22. Mastication. Salivary secretion. Swallowing.
23. Physiology of the stomach.
24. Physiology of the exocrine pancreas.
25. Liver and bile physiology.
26. Physiology of the small intestine.
27. Physiology of the large intestine.
28. Energy metabolism.

### **V. Physiology of the endocrine system (8 h).**

29. General characteristics of the endocrine system. Mechanisms of hormone action.
30. Hypothalamic and pituitary hormones.
31. Thyroid hormones.
32. Hormones involved in calcium and phosphate homeostasis.
33. Pancreatic hormones.
34. Adrenal gland. Steroid hormones and catecholamines.
35. Pineal gland. Melatonin.
36. Prostaglandins, thromboxanes and leukotrienes.

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### VI. Physiology of reproduction and development (2 h).

37. Physiology of pregnancy, childbirth and lactation.

38. Physiology of growth and development.

### VII. Integrated physiology (2 h).

39. Integration and adaptation of the organism. Exercise physiology. Biological rhythms.

40. Control of body temperature. Acclimatization.

### B) Practice program

Each student will perform 8 sessions of 2 hours.

- **Practice 1.** The laboratory in Physiology Sciences. Good Laboratory Practices (GLP). Safety rules in the laboratory.

- **Practice 2.** Hematological analysis and assessment of blood results. Hematocrit value. Study of leukocytes. Blood smears.

- **Practice 3.** Electrocardiography. Pulse and arterial blood pressure.

- **Practice 4.** Spirometry.

- **Practice 5.** Study of the urinary sediment. Determination of proteins, urea, and creatinine.

- **Practice 6.** Determination of salivary  $\alpha$ -amylase. Oral glucose tolerance test.

- **Practice 7.** Study of intestinal absorption of nutrients. This practice will be given in English, and students will practice technical terminology in this language.

- **Practice 8. Study of the physiological response to exercise.**

### C) Tutored projects

Each group of students will be assigned a topic related to different subjects of physiology. Students have to look for information on this topic, sort it, consult the doubts with the teacher and make a public presentation of their work.

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### D) Seminars

Four hours of seminars will be programmed in the classroom, and they will consist in the presentation and discussion of the tutored works carried out by the students.

### 5.4.Course planning and calendar

#### Calendar of attendance sessions and presentation of works:

The planning of this subject and the corresponding theoretical classroom sessions calendar, laboratory practice and presentation of tutored works, as well as the corresponding evaluation tests is organized from the Dean of the Faculty of Veterinary Medicine and informed through the Faculty website (<http://veterinaria.unizar.es/gradocta/>)

### 5.5.Bibliography and recommended resources

[BB: Bibliografía básica / BC: Bibliografía complementaria]

- [BB] Costanzo, Linda S.. Fisiología / Linda S. Costanzo ; [traducción, Juan Roberto Palacios Martínez ; revisión científica, Mónica Méndez Díaz] . 6ª ed. L'Hospitalet de Llobregat, Barcelona : Wolters Kluwer/ Lippincott Williams & Wilkins, cop. 2015
- [BB] Mulrone, Susan E.. Fundamentos de Fisiología / Susan E. Mulrone, Adam K. Myers; ilustraciones de Frank H. Netter ; ilustradores colaboradores, Carlos A. G. Machado... [et al.] ; [revisión científica, Mª Coronación Rodríguez Borrajo, Isabel Sánchez-Vera-Gómez-Trelles]. 2ª ed. Barcelona : Elsevier, D.L. 2016
- [BB] Prácticas de fisiología / Ana Isabel Alcalde Herrero ... [et al.] Zaragoza : Prensas Universitarias de Zaragoza, 2007
- [BB] Silbernagl, Stefan. Fisiología : texto y atlas / Stefan Silbernagl, Agamemnon Despopoulos ; ilustraciones de Rüdiger Gay y Astrid Rothenburger . 7ª ed. rev. y amp., 1ª reimp. Madrid [etc.] : Ed. Médica Panamericana, D.L.2007 (reimp. 2011)
- [BB] Tortora, Gerard J.. Principios de anatomía y fisiología [13ª ed.] / Gerard J. Tortora, Bryan Derrickson . 13ª ed. Buenos Aires ; Madrid [etc.] : Editorial Médica Panamericana, cop. 2013
- [BC] Fisiología médica / Kim E. Barrett ... [et al.]. 24ª ed. México, D.F. ; Madrid [etc.] : McGraw Hill- Interamericana, cop. 2013
- [BC] Fox, Stuart Ira : Fisiología humana / Stuart Ira Fox ; traducción, Bernardo Rivera Muñoz . - 13ª ed. México ; Madrid [etc.] : McGraw-Hill Education, cop. 2014
- [BC] Hall, John E. : Tratado de fisiología médica [13ª ed.] / John E. Hall ; [revisión científica, Xavier Gasull Casanova]. - 13ª ed. Barcelona : Elsevier España, D.L. 2016
- [BC] Silverthorn, Dee Unglaub. Fisiología humana : un enfoque integrado / Dee Unglaub Silverthorn ; con la colaboración de Bruce R. Johnson y William C. Ober, coordinador de ilustraciones, Claire W. Garrison, ilustradora, Andrew C. Silverthorn, consultor crítico . 6ª ed. Buenos Aires ; Madrid [etc.] : Editorial Médica Panamericana, cop. 2014 [Para acceder al texto completo mirar URL]

#### Listado de URL

- Búsquedas bibliográficas en PubMed [<http://www.ncbi.nlm.nih.gov/pubmed/medline.html>]
- Silverthorn, Dee Unglaub. Fisiología humana : un enfoque integrado / Dee Unglaub Silverthorn [<http://www.medicapanamericana.com/visorebookv2/ebook/9786079356224#{%22Pagina%22:%221%22,%22Vista%22:%22>]

## **30806 - General and nutritional physiology**

- Web de la Sociedad Española de Ciencias Fisiológicas [<http://www.secf.es/>]
- Web de la Unidad de Fisiología y de la asignatura [[http://www.unizar.es/depfarfi/unidad\\_fisiologia/](http://www.unizar.es/depfarfi/unidad_fisiologia/)]
- Web dedicada a los premios Nobel de Fisiología y Medicina [<http://www.almaz.com/nobel/medicine/>]