

## HUMAN AND CELL PHYSIOLOGY (II)

(approved by the Department Council on 22nd May, 2017)

MODULE	CONTENT	YEAR	TERM	CREDITS	TYPE
MEDICINE AND PHARMACOLOGY	HUMAN AND CELL PHYSIOLOGY II	2 <sup>nd</sup>	2 <sup>nd</sup>	6 ECTS	Obligatory
<b>LECTURER</b>			<b>CONTACT INFORMATION</b>		
<p><b>Theory</b></p> <ul style="list-style-type: none"> <li>• María López-Jurado</li> <li>• M<sup>a</sup> José Muñoz Alférez</li> <li>• Miguel Moreno Prieto</li> <li>• Teresa Nestares Pleguezuelo</li> <li>• Jesús M<sup>a</sup> Porres Foulquie</li> <li>• M<sup>a</sup> Dolores Yago Torregrosa</li> <li>• Javier Díaz Castro</li> <li>• Cristina Sánchez González</li> <li>• Carlos de Teresa Galván</li> <li>• Jerónimo Aragón Vela</li> <li>• Rosario Martínez Martínez</li> </ul> <p><b>Laboratory Practice</b></p> <ul style="list-style-type: none"> <li>• María López-Jurado</li> <li>• Magdalena López Frías</li> <li>• M<sup>a</sup> José Muñoz Alférez</li> <li>• Jesús M<sup>a</sup> Porres Foulquie</li> <li>• Cristina Sánchez González</li> <li>• Carlos de Teresa Galván</li> <li>• Mario Cordero Morales</li> <li>• Rosario Martínez Martínez</li> <li>• Jorge Moreno Fernández</li> </ul>			<p>Department of Physiology, 1<sup>st</sup> Floor, Faculty of Pharmacy, Phone: 958243879</p> <p><a href="mailto:mlopezj@ugr.es">mlopezj@ugr.es</a>, <a href="mailto:malferez@ugr.es">malferez@ugr.es</a>, <a href="mailto:mgmoreno@ugr.es">mgmoreno@ugr.es</a>, <a href="mailto:nestares@ugr.es">nestares@ugr.es</a>, <a href="mailto:jmporres@ugr.es">jmporres@ugr.es</a>, <a href="mailto:mdyago@ugr.es">mdyago@ugr.es</a>, <a href="mailto:javierdc@ugr.es">javierdc@ugr.es</a>, <a href="mailto:crissq@ugr.es">crissq@ugr.es</a>, <a href="mailto:cdeteresa@ugr.es">cdeteresa@ugr.es</a>, <a href="mailto:jeroav@ugr.es">jeroav@ugr.es</a>, <a href="mailto:rosariomz@ugr.es">rosariomz@ugr.es</a>, <a href="mailto:maglopez@ugr.es">maglopez@ugr.es</a>, <a href="mailto:mdcormor@ugr.es">mdcormor@ugr.es</a>, <a href="mailto:jorgemf@ugr.es">jorgemf@ugr.es</a></p>		
<b>DEGREE WITHIN THE SUBJECT IS TAUGHT</b>			<b>TUTORING AND MEETINGS</b>		
Degree in Pharmacy			<ul style="list-style-type: none"> <li>• María López-Jurado</li> </ul> <p>M: 8.30-10.30 h Fac. Pharmacy, and 12.30-14.30 h Vice-Rectorate of Teaching and Learning (H. Real) W: 8.30-10.30 h Fac. Pharmacy</p>		



	<ul style="list-style-type: none"> <li>• M<sup>a</sup> José Muñoz Alférez M, W, F: 10.30-11.30 h and 12.30-13.30 h</li> <li>• Miguel Moreno Prieto M, W, F: 10.00-12.00 h</li> <li>• Teresa Nestares Pleguezuelo 1st semester M, W, F: 12.30-14.30 h 2nd semester M, W, F: 9.30-11.30 h</li> <li>• Jesús M<sup>a</sup> Porres Foulquie M and F: 11.30-14.30 h</li> <li>• M<sup>a</sup> Dolores Yago Torregrosa M and W: 8.30-11.30 h</li> <li>• Javier Díaz Castro 1st semester: M, W, F: 17.00-19.00 h 2nd semester: M,W,Th,F: 16.00-17.00 h T: 16.00-17.00 and 18.00-19.00h</li> <li>• Cristina Sánchez González M: 11.30-14.30 h: T: 12.30-14.30 h and 16.00-17.00 h</li> <li>• Carlos de Teresa Galván M: 15.00-16.00 h and 19.00-20.00 h T, W, Th and F: 15.00-16.00 h</li> <li>• Jerónimo Aragón Vela T: 9.30-10.30 h</li> <li>• Rosario Martínez Martínez W: 9.30-11.00 h</li> <li>• Magdalena López Frías 1st semester: T: 11.00-14.00 h W: 10.30-13.30 h 2nd semester: T and Th: 10.30-11.30 h and 12.30-14.30 h</li> <li>• Mario Cordero Morales M: 18.00-20.00 h</li> <li>• Jorge Moreno Fernández M: 10.00-11.30 h</li> </ul>
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#### PREREQUISITES and/or RECOMMENDATIONS

**Prerequisites:** those necessary to access to the degree, related with the level of formation that the student must acquire to accede to the University.

**Recommendations:** to have previous basic knowledge (background knowledge of Chemistry, Anatomy and Histology, Biochemistry, Metabolism).

A good standard of English and informatics skills are also required.



## BRIEF ACCOUNT OF THE SUBJECT PROGRAMME

The programme has a high degree of **coherence and integration** and cover a diverse range of topics, while reflecting particular strengths within the biological and life sciences and there is a clear coherence between the different modules. Physiology is a study of the normal functions of cells, organs and systems of the living body, the mechanisms by which they are achieved and the regulation of functional activities to maintain the homeostasis, therefore **the programme has been divided into thematic units just for didactic purposes**, but during the course we will integrate all the body systems defining their links to maintain the homeostasis. The contents are divided in: Autonomic Nervous System: peripheral and central organization. Blood and body fluids. Cardiovascular System. Respiratory System. Excretory System. Digestive System. Reproductive System. Thermoregulation. Integumentary System. General adaptation syndrome.

## GENERAL AND PARTICULAR ABILITIES

GC9. - To intervene in the activities of promotion of health, prevention of disease, in the individual, familiar and community area with an integral and multiprofessional vision of the process health and disease.

GC13. - To develop skills of communication and information, both oral and written, to deal with patients and users of the center where it is developed the professional activity. To promote the capacities of work and collaboration in multidisciplinary teams and those related to other sanitary professionals.

GC15. - To recognize the own limitations and the need to support and update the professional competences, giving special importance to the autolearning of new knowledge being based on the scientific available evidence.

EC47. - To know and to understand the structure and function of the human body, as well as the general mechanisms of the disease, molecular, structural and functional alterations and therapeutic tools to restore the health.

## OBJECTIVES (EXPRESSED IN TERMS OF EXPECTED RESULTS OF THE TEACHING PROGRAMME)

The above mentioned objectives in this area are focus on promote that the future pharmacist acquires knowledge about the functioning of the human organism. To do so:

- Understanding the physiological processes, analyzing their biological meaning, description, regulation and integration at different levels of organization: cell, organ and body systems in health.
- Establish the basis for understanding the physiological adaptation process taking place due to a continuously changing environment.

## DETAILED SUBJECT TOPICS

### THEORETICAL UNITS:

1. Peripheral organisation of the autonomic nervous system
2. Central organization of the autonomic nervous system
3. Body Fluids. The blood
4. Physiology of the erythrocyte and leukocyte
5. Platelet physiology and hemostasis
6. Functional anatomy of the heart. Myocardial properties. Electrocardiogram.
7. Cardiac cycle. Cardiac output and factors affecting it.
8. Arterial and venous circulation.
9. Capillary and lymphatic circulation.
10. Cardiovascular regulation.
11. Structure-functional morphology of the respiratory system. Mechanical ventilation.



12. Exchange and transport of respiratory gases.
13. Regulation of respiration.
14. Structure and function of the excretory system. The nephron.
15. Mechanisms of urine formation.
16. Regulation of renal function.
17. Regulation of acid-base balance.
18. Functional structure of digestive tract. Gut motility.
19. Composition, function and regulation of digestive secretions.
20. Digestion and absorption.
21. Functions of the male reproductive and hormonal systems
22. Female physiology before pregnancy and female hormones
23. Physiology of fertilization, pregnancy, birth and lactation.
24. Thermoregulation
25. Integumentary system. Physiology of the skin and related structures.
26. General adaptation syndrome

### Theory Program (with targets)

#### Thematic Unit 1. Peripheral Organization of the Autonomic Nervous System (2h LM)

- ▶ Compare the autonomic and somatic nervous systems.
- ▶ Describe the functions of preganglionic and postganglionic neurons in the autonomic nervous system.
- ▶ Describe the organization and synaptic transmission in the sympathetic and parasympathetic nervous systems.
- ▶ Indicate the neurotransmitters and receptors of the sympathetic and parasympathetic nervous systems and its exceptions.
- ▶ List the physiological effects of the autonomic nervous system.

#### Thematic Unit 2. Central Organization of the Autonomic Nervous System (2h LM)

- ▶ Explain the functional relationship of the hypothalamus with the autonomic nervous system.
- ▶ Explain the mechanisms that regulate and control the intake of water and food.

#### Thematic Unit 3. Body Fluids. The blood (1,5 h)

- ▶ Describe the compartments that distributes water from the body
- ▶ Give an overview of the components of blood
- ▶ Give an estimate volume percentages and formed elements
- ▶ Describe the formed elements of the blood and their functions
- ▶ Describe the functions of the blood
- ▶ Understand what hematocrit value and clinical utility
- ▶ Describe the main plasma components and their functions
- ▶ Describe the different types of plasma proteins and their functions

#### Thematic Unit 4. Physiology of the erythrocyte and leukocyte (1,5h)

- ▶ Describe erythropoiesis and its regulation
- ▶ Explain the production and degradation of hemoglobin
- ▶ Describe the role of iron and its main metabolic aspects
- ▶ Knowing the current theories of the stem cells
- ▶ Explain how to determine the ABO blood groups and Rh factor
- ▶ Describe leukopoiesis
- ▶ List the functions of neutrophils, eosinophils and basophils

#### Thematic Unit 5. Platelet physiology and hemostasis (1,5h)

- ▶ Explain the formation of the platelet clothe
- ▶ Describe the mechanisms that contribute to hemostasis



- ▶ Identify the stages of blood coagulation and explain the various factors that stimulate and inhibit
- ▶ List the hemostatic regulatory mechanisms

**Thematic Unit 6. Functional Anatomy of the Heart. Myocardial properties. Electrocardiogram. (2h LM + 0.5S)**

- ▶ Describe the function of the heart chambers and valves
- ▶ Explain the functional characteristics of the myocardium.
- ▶ List the properties of the myocardium.
- ▶ Explain the functional characteristics of the cardiac conduction system.
- ▶ Explain the significance of the electrocardiogram (ECG) and its diagnostic significance.

**Thematic Unit 7. Cardiac cycle. Cardiac output and factors affecting it. (2h LM)**

- ▶ Explain the temporal sequence of contraction-relaxation in the cardiac cycle.
- ▶ Explain and relate the pressure changes that occur in the cardiac chambers with valves dynamics and blood movements during the cardiac cycle.
- ▶ Explain the origin and components that produce heart sounds.
- ▶ Define cardiac output and describe the factors that affect it: stroke volume and heart rate.
- ▶ List the factors controlling stroke volume and heart rate.

**Thematic Unit 8. Arterial and venous circulation. (1h LM + 0.5S)**

- ▶ Describe and differentiate the function of arteries and veins.
- ▶ Schematize the general circulation.
- ▶ Explain the factors that regulate the rate and blood flow.
- ▶ Define the concepts of systolic, diastolic, and mean differential blood pressure.
- ▶ Describe the mechanisms that are implemented in the short, medium and long-term blood pressure control.
- ▶ Explain the main determinants of the venous circulation.

**Thematic Unit 9. Capillary circulation and lymphatic circulation. (1h LM)**

- ▶ Differentiate the function of arterioles, capillaries and venules.
- ▶ Describe the organization of the microcirculatory unit.
- ▶ Analyze the pressures associated with the movement of fluids and substances between capillaries and interstitial spaces.
- ▶ Describe the circulation of the lymphatic vessels.
- ▶ Describe the formation and flow of lymph.
- ▶ Understand the functions of lymph.

**Thematic Unit 10. Cardiovascular regulation. (2h LM)**

- ▶ Explain the heart self regulation.
- ▶ Explain the role of baro and chemoreceptors in the control of the cardiovascular activity.
- ▶ Know the functioning of the nerve centers in the cardiocirculatory activity control.

**Thematic Unit 11. - Morphofunctional structure of the respiratory system. Mechanical ventilation. (1h LM + 1S)**

- ▶ Describe the function of the respiratory tract.
- ▶ Describe the processes causing inspiration and expiration.
- ▶ Explain what is meant by surface tension and the role of alveolar surfactant.
- ▶ Describe and differentiate anatomic dead space and physiologic dead space.
- ▶ Define and quantify lung volumes and capacities.
- ▶ Describe the unique characteristics of the pulmonary circulation.

**Thematic Unit 12. - Exchange and transport of respiratory gases. (1.5h LM + 0.5S)**

- ▶ Knowing the partial pressures of oxygen and carbon dioxide in the atmosphere, alveoli, blood and tissues, and based on that describe the diffusion of gases.
- ▶ Describe the different ways in which oxygen and carbon dioxide is transported by the blood.



- ▶ Explain the role of hemoglobin in the transport of CO<sub>2</sub>.

#### **Thematic Unit 13. - Regulation of respiration. (1.5h LM)**

- ▶ Describe the areas of the central nervous system and the mechanisms involved in the nervous control of respiration.
- ▶ Explain peripheral mechanisms that contribute to the maintenance of normal breathing patterns.
- ▶ Describe the role of central and peripheral chemoreceptors on breathing control.

#### **Thematic Unit 14. - Morphological-functional structure of the excretory system. The nephron. (1h LM + 0.5S)**

- ▶ Make a list of kidney functions.
- ▶ Describe the functional anatomy of the nephron.
- ▶ Know the structure and function of the juxtaglomerular apparatus.

#### **Thematic Unit 15. - Mechanisms of urine formation. (2h LM)**

- ▶ Define glomerular filtration explaining the mechanisms that produce it.
- ▶ Explain the basic mechanisms of tubular reabsorption and secretion.
- ▶ Explain the countercurrent mechanism.
- ▶ Explain the mechanisms and factors involved in the concentration and dilution of urine.
- ▶ Explain the concept of urine clearance and usefulness.
- ▶ Explain the mechanisms and stages that occur in urination.

#### **Thematic Unit 16. Regulation of renal function. (1.5h LM)**

- ▶ Knowing the self and endocrine regulation of glomerular filtration.
- ▶ Describe the role of the renin-aldosterone-angiotensin system in the reabsorption and secretion of electrolytes.
- ▶ Understand the role of antidiuretic hormone on water reabsorption in the renal tubules.

#### **Thematic Unit 17. Regulation of acid-base balance. (1h LM + 0.5S)**

- ▶ Relate hydrogen ion secretion by the kidney in the maintenance of acid-base balance.
- ▶ Explain the importance of buffer systems for the acid-base balance.
- ▶ Define the concepts of acidosis and alkalosis.
- ▶ Describe the importance of the respiratory system in the regulation of acid-base balance.

#### **Thematic Unit 18. Morphological-functional structure of the digestive tract. Gut motility. (2h LM + 0.5S)**

- ▶ Identify the digestive organs.
- ▶ Describe the layers forming the wall of the digestive tract.
- ▶ Describe the general functions of the digestive tract.
- ▶ Explain the mechanisms of swallowing and transportation of food to the stomach.
- ▶ List the factors regulating gastric emptying.
- ▶ List the different types of intestinal motility and describe the functions of each one.
- ▶ Explain the mechanisms involved in the defecation reflex.

#### **Thematic Unit 19. Composition, function and regulation of digestive secretions. (2.5h LM)**

- ▶ Describe the composition, function and regulation of salivary secretion.
- ▶ Describe the composition, function and regulation of gastric secretion.
- ▶ Describe the composition, function and regulation of pancreatic secretion.
- ▶ Describe the composition, function and regulation of bile secretion.
- ▶ Describe the composition, function and regulation of intestinal secretion.

#### **Thematic Unit 20. Digestion and absorption. (1.5h LM + 1S)**

- ▶ Know the basic principles of gastrointestinal absorption.
- ▶ Describe the digestion and absorption of carbohydrates.



- ▶ Describe the digestion and absorption of proteins.
- ▶ Describe the digestion and absorption of lipids.
- ▶ Explain the absorption of water and electrolytes.
- ▶ Explain the absorption of vitamins.

**Thematic Unit 21. Functions of the male reproductive and hormonal (1h LM + 0.5S)**

- ▶ Knowing the physiology of the male sexual organs.
- ▶ Describe the phases of the spermatogenesis process and the functions of Sertoli cells in this process.
- ▶ Describe the function of the seminal vesicles and the prostate gland.
- ▶ Describe the hypothalamic-pituitary-testicular control of testosterone secretion.
- ▶ Puberty and regulation of its beginning.

**Thematic Unit 22. Female physiology before pregnancy, and female hormones (1h LM + 0.5S)**

- ▶ Knowing the physiology of the female sexual organs.
- ▶ Describe the different phases of ovarian and menstrual cycles.
- ▶ Explain the hormonal interactions involved in the control of the ovulation.
- ▶ Describe the physiological effects of estrogens and progesterone.
- ▶ Describe the hypothalamic-pituitary-ovarian control of the secretion of estrogens and progesterone.
- ▶ Compare the different types of contraceptive methods and their effectiveness.

**Thematic Unit 23. Physiology of fertilization, pregnancy, birth and lactation. (1h LM + 0.5S)**

- ▶ Describe the structure and functions of the placenta.
- ▶ Know the hormones secreted by the placenta and describe their actions.
- ▶ Describe the evolution of the plasma levels of estrogens, progesterone and chorionic gonadotropin throughout gestation.
- ▶ List the functional changes in the endocrine glands of women during pregnancy.
- ▶ Explain the hormonal mechanisms involved in the birth.
- ▶ Describe the hormonal interactions taking place in the initiation and maintenance of breastfeeding.

**Thematic Unit 24. Thermoregulation (0.5h LM + 0.5S)**

- ▶ Remember homeothermy and poikilothermia concepts.
- ▶ Study the importance of maintaining body temperature.
- ▶ To study the role of the hypothalamus in the body thermoregulation system.
- ▶ Consider what happens in situations of altered regulation of body temperature.

**Thematic Unit 25. Integumentary system. Physiology of the skin and related structures. (0.5h LM + 0.5S)**

- ▶ Describe the layers of the epidermis and dermis, and the cells that compose it.
- ▶ Describe the functions of the skin.
- ▶ Compare the structure and functions of the skin and annexed structures.
- ▶ Know the regulation of skin sweats

**Thematic Unit 26. General adaptation syndrome (1h LM + 0.5S)**

- ▶ Explain the afferents that mediate the endocrine response to stress.
- ▶ To study the activation of the autonomic nervous system and the adrenal medulla.
- ▶ Understand the response of the different body systems regarding the adaptation to stress.

**LABORATORY PRACTICE PROGRAM**

Practice 1. - Microscopy study of cell components of the blood (functional description)

Practice 2. -Cardiovascular Physiology (simulated). Electrocardiogram

Practice 3. - Measurement of arterial blood pressure in humans and its computer simulation.

Practice 4. - Mechanisms of the respiratory system (simulated). Measurement of lung volumes and capacities: spirometry.





Practice 5. - Physiology of the renal system (simulated)  
Practice 6. - Physical and chemical processes of digestion (simulated).  
Practice 7. - Measurement of glucose uptake. Intestinal perfusion  
Practice 8. - Physiology of the Reproductive System: Hormone replacement therapy (simulated)

Theoretical-practical exam

For each academic year, a selection of the above list will be performed at the physiology laboratory.

## SYSTEM FOR ASSESSING THE ACQUISITION OF THE COMPETENCES AND KNOWLEDGE/EVALUATION CRITERIA

### I. Continuous Assessment

This is the default system. Continuous Assessment includes several theory exams which will take place on dates scheduled by the Faculty in coordination with the other subjects offered in the term. Prior to the exam, the lecturer will describe the structure and type of exam questions. Coursework performed by the students (essays, presentations, seminars...) as well as regular attendance and class participation will be also assessed.

The final mark will be calculated according to the following:

Theory: 70%  
Laboratory practice: 10%  
Coursework (presentations, seminars, etc.): 10%  
Attendance to theoretical classes: 10%

A minimum mark of 5 (out of 10) in both the theory and laboratory practice sections must be obtained in order to pass the subject.

### II. Single Final Assessment

According to the Students Assessment and Qualification Policy of the University of Granada (adopted by the Governing Council on Oct 26, 2016), those students who cannot follow the continuous assessment system due to working, health or disability issues (or any other reason appropriately justified) can apply for a Single Final Assessment. For this purpose, the student will submit a formal request to the Director (Head) of the Department, arguing and proving (with documented evidence) the reason for not being able to follow the continuous system. The submission deadline will be 2 weeks after the beginning of the lectures. In extraordinary circumstances, the starting date for counting the 2-week period will be the enrolment date (policy NCG78/9) and, in this case, the student will have to include the proof of enrolment date when making the request. After ten days without the student receiving a written reply from the Director of the Department, it will be understood that the request has been deemed. In case of denial, the student may file, within one month, an appeal to the Rector, who may delegate this task to the Dean or Director of the Centre, exhausting the administrative proceedings.

For students in the Single Final Assessment system, the final mark will be calculated according to the following:

Theory: 90%  
Laboratory practice: 10%

A minimum mark of 5 (out of 10) in both the theory and laboratory practice sections must be obtained in order to pass the subject.





## BIBLIOGRAPHY

### Print Books on Physiology

- CORDOBA, A. "Physiology Dynamics". Barcelona: Ed. Masson, 2003.
- COSTANZO, L. S. "Physiology". 5th edition. Barcelona: Elsevier Saunders, 2014.
- DVORKIN, M.A. and CARDINALI, D.P. Best & Taylor: Physiological Basis of Medical Practice. 14th edition. México: Ed. Médica Panamericana, 2010.
- FOX, S. I. Human Physiology. 12th edition. Aravaca (Madrid): Ed. McGraw-Hill-Interamericana, 2011.
- GANONG, W. F. Medical Physiology. 24th edition. México: Ed. Mc Graw-Hill, 2013.
- GUYTON, A.C. and HALL, J.E. Tratado de Fisiología Médica. 13ª edición. Madrid: Ed. Elsevier , 2016.
- LEVY B. KOEPPEN M, STANTON BA. Berne Levy Physiology. 6th edition. Madrid: Elsevier Mosby; 2009.
- RHOADES, R. and TANNER, G.A. Medical Physiology. Barcelona: Ed. Masson, 2003.
- SILBERNAGL, S. " Physiology. Text and Atlas ". 7th edition. México. Médica Panamericana, 2008.
- SILVERTHORN, D. U. "Human Physiology. An integrated approach". 6th edition. México. Médica Panamericana, 2014.
- TORTORA, G.J. and DERRICKSON, B. Principles of Anatomy and Physiology. 13th edition. Méjico: Ed. Médica Panamericana. 2013.
- TORTORA, G.J. GRABOWSKAY, S.R., Principles of Anatomy and Physiology. 9th edition. Méjico: Ed. Oxford University Press. 2002.
- TRESGUERRES, J.A.F. et all, Human Physiology. 4th edition. Madrid: Ed. Interamericana-McGraw-Hill, 2014. Print Journals

### Newspaper Publication

- American Journal of Physiology.
- Canadian Journal of Applied Physiology.
- European Journal of Applied Physiology.
- Annual Review of Physiology.
- Handbook of Physiology.
- News in Physiological Reviews.

## RECOMMENDED INTERNET LINKS



## Electronic Books

- [Cardiovascular Physiology/](#) Hans-Joachim Priebe and Karl Skarvan, 2000. (netLibrary)
- [Origination of Organismal Form: Beyond the Gene in Developmental and Evolutionary Biology/](#) Vienna Series in Theoretical Biology, 2003. (netLibrary)
- [Purkinje's Vision: The Dawning of Neuroscience/](#) Nicholas Wade, Josef Brozek, JirA Hoskovek, 2001. (netLibrary)

## Electronic Journals

- [Advances in Physiology Education](#) (DOAJ)
- [American Journal of Physiology](#) (EBSCO Open Access)
- [BMC Physiology](#) (DOAJ)
- [Experimental Physiology \(Cambridge\)](#) (EBSCO Open Access)
- [Journal of Applied Physiology](#) (Free Medical Journals)
- [Nephron – Physiology](#) (Academic Search Premier)
- [Journal of Physiology](#) (Free Medical Journals)
- [The Journal of General Physiology](#) (Free Medical Journal)

## ON-LINE RESOURCES

<http://www.youtube.com/watch?v=aQZaNXNroVY&feature=related> Renal System  
<http://www.youtube.com/watch?v=URHBBE3RKEs&feature=fvsr> Digestive System  
<http://www.youtube.com/watch?v=Z7xKYNz9AS0&feature=related> Digestive System  
<http://www.youtube.com/watch?v=HiT621PrrO0&feature=related> Respiratory System  
<http://www.youtube.com/watch?v=rBQOLiFto6Q&feature=related> Circulatory System  
<http://www.youtube.com/watch?v=rguztY8aqpk&feature=related> Cardiac Cycle  
<http://www.youtube.com/watch?v=qGIJ5AiVrzQ&feature=related> Menstrual Cycle

<http://www.the-aps.org/> The American Physiological Society  
<http://physoc.org/> The Physiological Society  
<http://www.seccff.org/> Sociedad Española de Ciencias Fisiológicas  
<http://www.feps.org/> Federación Europea de Sociedades de Fisiología

## PRACTICAL LABORATORY CLASSES

Group work sessions in the laboratory supervised by the lecturer. Meaningful construction of knowledge through interaction and student activity.

The teacher will explain and perform the practice for a small group of students, then the student will practice individually supervised by the teacher and they will complete the various activities proposed in the workbook. At the end of the practices, the student will deliver the notebook with individual results and answers to the questions proposed. This notebook will be corrected by the teacher and returned to the student with the relevant qualification.

## TUTORING

Personalized and small group attention. **Continuous instruction and/or orientation carried out by the lecturer** for the purpose of reviewing and discussing the materials and topics presented in lectures, seminars, readings, writing papers and of course to answer questions related with the subject.



## ADDITIONAL COMMENTS

### CONTEXT WITHIN THE DEGREE

The aim of the teachings of the Degree of Pharmacy is to train experts in drug knowledge and its impact on health, as referred to in the European Directive 85/432 by regulating its teachings. With the study of Human and Cell Physiology (FCH) is intended that the future pharmacist acquire knowledge about the functioning of the human organism. This course is supplemented by Human Physiology II, Pathophysiology (FP), Physiology and Biochemistry Clinics (FBC), Immunology and Human Body Disorders: Functional Testing (AOH), which are discussed in later courses and provides a basis for understanding other basic materials for the pharmaceutical, such as "Pharmacology" and "Pharmacognosy and Phytotherapy", "Clinical Pharmacy and Pharmacotherapy", "Biopharmaceutics and Pharmacokinetics", "Pharmaceutical Technology" and "Nutrition and Food Science." One of the main objectives of the Degree of Pharmacy is the knowledge of different medicines, from research and preparation, dispensing, and knowing potential side effects.

The contents of Cell Physiology and Human subjects are studied on two: FCH I and II, dealing with the study of the various organ systems and their mode of regulation. To facilitate the assimilation of that content from a didactic point of view, we study first the FCH I, cell physiology and large integration systems, nervous and endocrine systems. Then FCH II is focused on different organ systems and the autonomic nervous system, responsible for their regulation along with the endocrine system. However, to maintain the notion that the human body is a functional unit that depends on coordinated functioning and is not the sum of isolated body parts, integrative units such as thermoregulation and general adaptation syndrome are studied at the end of the program.

