

## NAME OF THE SUBJECT: PATHOPHYSIOLOGY

(approved by the Department Council on 22<sup>nd</sup> May, 2017)

MODULE	CONTENT	YEAR	TERM	CREDITS	TYPE
Medicine and Pharmacology	Pathophysiology	3 <sup>rd</sup>	1 <sup>st</sup>	6 ECTS	Required (Mandatory)
<b>LECTURER(S)</b>			<b>Postal address, telephone n°, e-mail address</b>		
Theory <ul style="list-style-type: none"> <li>• Mariano Mañas Almendros</li> <li>• Emilio Martínez de Victoria Muñoz</li> <li>• Miguel Moreno Prieto</li> <li>• M<sup>a</sup> Inmaculada López Aliaga</li> <li>• Magdalena López Frías</li> </ul> Laboratory Practice <ul style="list-style-type: none"> <li>• Mariano Mañas Almendros</li> <li>• Emilio Martínez de Victoria Muñoz</li> <li>• Miguel Moreno Prieto</li> <li>• Virginia Aparicio García-Molina</li> <li>• M<sup>a</sup> Alba Martínez Burgos</li> </ul>			Department of Physiology, School of Pharmacy, University of Granada. Phone number: +34 958 243879  <a href="mailto:mariano@ugr.es">mariano@ugr.es</a> , <a href="mailto:emiliom@ugr.es">emiliom@ugr.es</a> , <a href="mailto:mgnoreno@ugr.es">mgnoreno@ugr.es</a> , <a href="mailto:milopez@ugr.es">milopez@ugr.es</a> , <a href="mailto:maglopez@ugr.es">maglopez@ugr.es</a> , <a href="mailto:virginiaparicio@ugr.es">virginiaparicio@ugr.es</a> , <a href="mailto:malbam@ugr.es">malbam@ugr.es</a>		
<b>DEGREE WITHIN THE SUBJECT IS TAUGHT</b>			<b>TUTORING AND MEETINGS</b>		
Degree in Pharmacy			<ul style="list-style-type: none"> <li>• Mariano Mañas Almendros: Monday, Wednesday and Friday 11,30-13,30</li> <li>• Emilio Martínez de Victoria Muñoz: Monday, Wednesday and Friday 11,30-13,30</li> <li>• Miguel Moreno Prieto: Monday, Wednesday and Friday 09,30-11,30</li> <li>• M<sup>a</sup> Inmaculada López Aliaga: First semester: Monday, Wednesday and Friday 10,30-11,30 and 12,30-13,30 Second semester: Monday 17,00-19,00; Thursday 13,30-14,30 h; Friday 9,00-12,00</li> <li>• Magdalena López Frías: First semester: Tuesday 11,00-14,00 and Wednesday 10,30-13,30 Second semester: Tuesday and Thursday 10,30-</li> </ul>		



	<p>11,30 and 12,30-14,30</p> <ul style="list-style-type: none"> <li>• M<sup>a</sup> Alba Martínez Burgos: Tuesday and Thursday 9,00-12,00</li> </ul>
<p><b>PREREQUISITES and/or RECOMMENDATIONS (if necessary)</b></p>	
<p><b>Prerequisites:</b> those necessary to access to the degree, related with the level of formation that the student must acquire to accede to the University.</p> <p><b>Recommendations:</b> to have previous basic knowledge of Chemistry, Biophysics, Physical Chemistry, Biology, Anatomy and Histology, Biochemistry (I and II), Cellular and Human Physiology (I and II). A good standard of English and informatics skills are also required.</p>	
<p><b>BRIEF ACCOUNT OF THE SUBJECT PROGRAMME</b></p>	
<p>General aspects of pathophysiology. Dysfunction and disorders of the musculoskeletal system, cardiovascular system, respiratory system, gastrointestinal system, renal system, nervous system, and hormonal systems.</p>	
<p><b>GENERAL AND PARTICULAR ABILITIES</b></p>	
<p>Take part in health promotion and disease prevention activities at the individual, familiar and community level with an integral point of view of the health-disease process</p> <p>Develop verbal and written communication skills to interact with faculty, staff, peers, patients, and other health professionals. Promote working and cooperation skills within multidisciplinary teams and those related with other health care professionals.</p> <p>Be aware of personal limitations and the need to maintain and actualize the professional competency, with special emphasis to self-learning of new knowledge based on available scientific evidence.</p> <p>Be familiar with and comprehend the structure and function of human body as well as the general mechanisms of disease, molecular, structural and functional alterations, syndrome expression, and therapeutic strategies to restore health and wellness</p>	
<p><b>OBJECTIVES (EXPRESSED IN TERMS OF EXPECTED RESULTS OF THE TEACHING PROGRAMME)</b></p>	
<p>At the completion of the course the student should be able to:</p> <ul style="list-style-type: none"> <li>• Describe the functional alterations in specialized organs and tissues that are responsible for disorders that involve these organs, as well as the etiopathogenic mechanism involved in the alterations, and the symptomatology of each disease.</li> <li>• Describe the adequate response of human body against the modifications exerted by agents causing internal or external injury.</li> <li>• Comprehend the concepts of health and disease</li> <li>• Comprehend the pathophysiological substrate of disease</li> <li>• Comprehend the activity of different drugs on the organism in order to avoid the appearance of side effects induced by pharmacological treatments and be more efficient at the design of new drugs.</li> <li>• Describe the compensatory mechanism to maintain system homeostasis under pathological conditions</li> </ul>	



- Relate these concepts with previous knowledge and acquire the scientific base for more elaborate posterior knowledge

## DETAILED SUBJECT TOPICS

### THEMATIC UNIT I: INTRODUCTION AND GENERAL PATHOPHYSIOLOGY

Module 1: Normal and pathologic function(1 H)

Module 2: Cellular responses to stress and toxic insults. Alterations in cell physiology I: Apoptosis and ageing. (1 H)

Module 3: Cellular responses to stress and toxic insults. Alterations in cell physiology II: Necrosis and environmental diseases. (1 H)

Module 4: Acute and chronic inflammation(1 H)

### THEMATIC UNIT II: SYSTEMIC PATHOPHYSIOLOGY. THE NERVOUS SYSTEM

Module 5: Pathophysiology of sensory function(1 H)

Module 6: Pathophysiology of peripheral, medular and brain stem alterations. Pathophysiology of the upper and lower motor neuron. (1 H)

Module 7: Pathophysiology of motor coordination. (1 H)

Module 8: Pathophysiology of basal ganglia. (1 H)

Module 9: Pathophysiology of Autonomic Nervous System. Mood alterations. (1 H)

Module 10: Pathophysiology of cerebral cortex. (1 H)

Module 11: Alterations of consciousness, epilepsies, and sleeping disorders(1 H)

### THEMATIC UNIT III: MUSCULOSKELETAL SYSTEM

Module 12: Pathophysiology of muscle. (1 H)

Module 13: Pathophysiology of bone. (1 H)

Module 14: Pathophysiology of joints. (1 H)

### THEMATIC UNIT IV: ENDOCRINE SYSTEM

Module 15: Pathophysiology of growth. Alterations of the hypothalamic-pituitary axis(1 H)

Module 16: Pathophysiology of Thyroid gland. Goiter. Hyperfunction, hypofunction. (1 H)

Module 17: Alterations in calcium and phosphate metabolism. (1 H)

Module 18: Alterations of suprarenal cortex function. (1 H)

Module 19: Alterations of glucidic and lipidic metabolism. (1 H)

Module 20: Alterations of protein and amino acid metabolism. (1 H)

### THEMATIC UNIT V: BLOOD

Module 21: Pathophysiology of Erythrocytes.

Module 22: Pathophysiology of Leukocytes.

Module 23: Pathophysiology of hemostasis and thrombosis.

### THEMATIC UNIT VI: CARDIOVASCULAR SYSTEM

Module 24: Pathophysiology of valve malfunction. Valvular heart disease. (1 H)

Module 25: Pathophysiology of heart bit rate and rhythm disorders. Cardiac arrhythmia(1 H)

Module 26: Pathophysiology of coronary circulation. (1 H)

Module 27: Pathophysiology of arterial blood pressure. (1 H)

Module 28: Cardiac insufficiency. Pathophysiology of the pericardium. (1 H)

Module 29: Acute circulatory failure. (1 H)

Module 30: Pathophysiology of peripheral vascular system. (1 H)

### THEMATIC UNIT VII: RESPIRATORY SYSTEM

Module 31: Respiratory failure I: Classifications. Symptomatology. Obstructive lung disease. (1 H)

Module 32: Respiratory failure II. Restrictive lung disease. (1 H)

Module 33: Pathophysiology of pulmonary circulation. (1 H)



Module 34: Alterations of respiratory rhythm and pattern. (1 H)

#### **THEMATIC UNIT VIII: RENAL SYSTEM**

Module 35: Alterations of glomerular and tubular functions. (1 H)

Module 36: Acute and Chronic renal failure. (1 H)

Module 37: Pathophysiology of urinary tract. (1 H)

Module 38: Acid-base metabolism disorders. (1 H)

#### **THEMATIC UNIT IX: DIGESTIVE SYSTEM**

Module 39: Disorders of gastrointestinal motility/transit. (1 H)

Module 40: Disorders of gastric and intestinal secretions. (1 H)

Module 41: Symptomatology of digestive pathology. (1 H)

Module 42: Syndromes of gastrointestinal tract pathology. (1 H)

Module 43: Syndromes of liver, biliary tract and pancreas pathology. (1 H)

#### **THEMATIC UNIT X: REPRODUCTIVE SYSTEM**

Module 44: Alterations in sex differentiation and development. (1 H)

Module 45: Disorders of testicular function. (0,5 H)

Module 46: Disorders of ovary function. (0,5 H)

#### **PRACTICAL LABORATORY CLASSES**

Group work sessions in the laboratory supervised by the lecturer. Meaningful construction of knowledge through interaction and student activity. Assistance is required. Students will use a pathophysiology laboratory notebook provided by the Department of Physiology in which they will annotate the results and complete the different exercises and problems proposed. Upon completion of the practical laboratory classes, the laboratory notebook will be evaluated by the instructor and it will count as part of the practical laboratory grade.

The practical classes at the laboratory will be taught as follows:

**Practical session 1.** Pathophysiology of renal system. Alterations of glomerular filtration. Pathophysiology cases for problem-solving learning and software simulation.

**Practical session 2.** Pathophysiology of digestive system. Pathophysiology cases: Lactose intolerance, bile acid deficiency, peptic ulcer.

**Practical session 3.** Pathophysiology of reproductive system. Ovulation and fertility test.

**Practical session 4.** Pathophysiology of endocrine system. Carbohydrate and lipid metabolism.

**Practical session 5.** Pathophysiology of nervous system. Neurophysiology of nerve impulse. Pathophysiology cases for problem-solving learning and software simulation

#### **SYSTEM FOR ASSESSING THE ACQUISITION OF THE COMPETENCES AND KNOWLEDGE**

##### **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

- Porth CM. Essentials of Pathophysiology: Concepts of Altered Health States. 3<sup>rd</sup> Edition, Wolters Kluwer Health | Lippincott Williams & Wilkins, 2011
- Kumar V, Abbas AK, Aster JC, Fausto N. Robbins & Cotran Pathologic Basis of Disease. 8<sup>th</sup> Edition, Elsevier, 2010
- Laso, FJ. Patología general: introducción a la medicina clínica. 3<sup>a</sup> edición. Ed. Masson, 2015
- G<sup>a</sup> Conde J, Merino Sánchez J, González Macías J. Patología General: Semiología Clínica y Fisiopatología. 2<sup>a</sup> Edición. Ed. Interamericana – Mc Graw-Hill. Madrid, 2003.
- Pérez Arellano JL. Sisinio de Castro. Manual de Patología General. 7<sup>a</sup> Edición. Ed. Masson S.A. Barcelona, 2013.
- Setter FH. Atlas of Human Anatomy. 5<sup>th</sup> Edition, Saunders Elsevier, 2011.

### Sistema nervioso

[Instituto Federico Olóriz](http://www.ugr.es/)

<http://www.ugr.es/>

[The W.U.S.M. Neuroscience Tutorial](http://thalamus.wustl.edu/course/) <http://thalamus.wustl.edu/course/>

[Universidad de Cornell](http://www.cornell.edu/)

<http://www.cornell.edu/>



### **Sistema muscular**

[Muscle Physiology - Introduction to Muscle](#)

<http://ortho84-13.ucsd.edu/musintro/jump.shtml>

<http://www.biology-pages.info/M/Muscles.html>

### **Sistema respiratorio**

[Interpreting Spirometry](#) <http://www.vh.org/Providers/Simulations/Spirometry/InterpSpiro.html>

### **Sistema cardiovascular**

<http://depts.washington.edu/physdx/heart/demo.html>

<http://www.wilkes.med.ucla.edu/Physiology.htm>

<http://www.blaufuss.org/>

### **Sistema digestivo**

[GI TRACT](#) <http://www.pathguy.com/lectures/guts.htm>

### **Sistema renal**

[Medical Tests of Kidney Function](#) <http://www.niddk.nih.gov/health/kidney/summary/kidtests/kidtests.htm>

[Renal Function test](#) [http://student.uq.edu.au/~s004825/d01.htm#Renal Function](http://student.uq.edu.au/~s004825/d01.htm#Renal%20Function)

<http://www.biology-pages.info/K/Kidney.html>

### **Sistema Endocrino**

[Endocrine Diseases thyroid, parathyroid adrenal and diabetes.](#) <http://www.endocrineweb.com/>

[GraphPad Radioactivity Calculator](#) <http://www.graphpad.com/www/radcalc.htm>

<http://www.biology-pages.info/H/Hormones.html>

