

CLINICAL PHYSIOLOGY AND BIOCHEMISTRY

Approved by the Council of the Department of Physiology on 26th April 2018

Approved by the Council of the Department of Biochemistry on 7th June 2018

MODULE	CONTENT	YEAR	TERM	CREDITS	TYPE
MEDICINE AND PHARMACOLOGY	CLINICAL PHYSIOLOGY AND BIOCHEMISTRY	4th	2nd semester	6 ECTS (4.5 T+ 1.5 P)	Compulsory
LECTURER(S)			Postal address, telephone nº, e-mail address Department of Physiology, 1st Floor, Faculty of Pharmacy, Phone: 958 243879 Department of Biochemistry, 4st Floor, Faculty of Pharmacy, Phone: 958 243838		
CLINICAL PHYSIOLOGY 1. Francisco Lisbona Delgado (Grupo A y C) 2. M^a Inmaculada López Aliaga (Grupo D) 3. Javier Díaz Castro (Grupo E) 4. M^a José Muñoz Aliérez (Grupo E) CLINICAL BIOCHEMISTRY 1. José Luis Periago Mínguez (Grupo A y E) 2. M^a del Mar Sola Zapata (Grupo C) 3. M^a Dolores Mesa García (Grupo D)					
			http://www.ugr.es/~fisiougr/tutorias.php		
DEGREE WITHIN WHICH THE SUBJECT IS TAUGHT					
Degree in Pharmacy					
PREREQUISITES and/or RECOMMENDATIONS (if necessary)					
<ul style="list-style-type: none"> - It is recommended to have a previous basic knowledge (background knowledge) of Human and Cell Physiology (I and II), Physiopathology, Structural Biochemistry, Metabolic Biochemistry and Human Anatomy. - A good level of English and Informatics skills are also required. - Ability to process and to elaborate documents in virtual format and on paper. 					



BRIEF ACCOUNT OF THE SUBJECT PROGRAMME (ACCORDING TO THE DEGREE ¿??)

Introduction to laboratory diagnosis of common diseases. Clinical Physiology. Clinical Biochemistry and Molecular Pathology.

GENERAL AND PARTICULAR ABILITIES

GENERIC SKILLS:

- CG9. To participate in the activities of promotion of the health, prevention of disease, in the individual, familiar and community area; with the integral and multiprofessional vision of the process health - disease.
- CG10. To design and to evaluate reagents, methods and analytical clinical technologies, knowing the basic foundations of the clinical analyses and the characteristics and contents of the laboratory diagnosis.
- CG13. To develop skills of communication and information, both oral and written, to deal with patients and users of the center where to perform his professional activity. To promote the capacities of work and collaboration in multidisciplinary teams and the related ones to other sanitary professionals.
- CG15. To recognize the own limitations and the need to support and update the professional career, giving special importance to the independent learning of new knowledge being based on the scientific available evidence.

SPECIFIC SKILLS:

- CE36. To know and understanding the basic foundations of the clinical analyses, the characteristics and contents of the results of the main clinical laboratory tests.
- CE39. To know and understanding the technologies and skills used in the design and evaluation of the preclinical and clinical tests.
- CE49. To know the analytical technologies and skills related to the laboratory diagnostics.

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

- To integrate the knowledge obtained in the Clinical subjects of Physiology and Biochemistry.
- To interpret the laboratory tests used in the diagnosis and follow-up of common diseases.
- To apply the interpretation of laboratory information in the follow-up of the efficiency and of the therapeutic safety.
- To be able to accomplish of reports with the results of the physiological and biochemical diagnosis of laboratory.
- To introduce the specialization in the clinical matters of Clinical Analyses, Clinical Biochemistry, Microbiology and Clinical Parasitology.

DETAILED SUBJECT SYLLABUS

THEORETICAL PROGRAM

BLOCK I. CLINICAL PHYSIOLOGY

THEMATIC UNIT 1. METHODS OF BLOOD'S EXTRACTION (1.5 h.)

Extraction of arterial, capillary and venous blood. Common errors. Blood components. Obtaining of total



blood, serum and plasma. Anticoagulants most commonly used.

THEMATIC UNIT 2. HEMATOPOYETIC ORGANS (1.5 h.)

Blood cells, origin, differentiation and cellular maturation. Morphologic characteristics of the blood cells.

THEMATIC UNIT 3. BASIC HEMATIMETRY

Blood cells count, haematocrit, haemoglobin, erythrocyte indices, leucocitary formula. Stainings in hematología. Automatic Haematology Analyzer. Globular sedimentation velocity.

THEMATIC UNIT 4. INTRODUCTION TO THE STUDY OF THE ERITROCITARY PATHOLOGY (1 h.)

Anemias, classification of anemias for basic hematimetry. Anemias microcytics, macrocytics and normocytics. Physiopatological classification: Regenerative and arregenerative anemias

THEMATIC UNIT 5. MICROCYTIC ANEMIAS (3h.)

Iron deficiency anaemia. Anemia of chronic diseases. Thalassemic syndromes. Sideroblastic anemias.

THEMATIC UNIT 6. MACROCYTIC ANEMIAS (1 h.)

Megaloblastic anemias by vitamin B12 and folic acid deficiency. Non-megaloblastic macrocytic anemias.

THEMATIC UNIT 7. NORMOCYTIC ANAEMIAS (2 h.)

Congenital and acquired haemolytic anemias. Structural hemoglobinopathies. Alterations of the erythrocytary membrane. Aplastic anemia.

THEMATIC UNIT 8. INTRODUCTION TO THE STUDY OF THE LEUKOCITARY FUNCTIONALISM (2 h.)

Functional granulocytopathies. Constitutional anomalies of the leukocytes. Agranulocytosis and neutropenia. Alterations of the mononuclear phagocyte system. Leukemoid reactions.

THEMATIC UNIT 9. CHRONIC MYELOPROLIFERATIVE SYNDROMES (1 h.)

Chronic myeloid leukaemia. Chronic myeloproliferative syndromes with hemo-peripheral expression. T and B-cell chronic lymphocytic leukaemia.

THEMATIC UNIT 10. CLASSIFICATION OF THE ACUTE LEUKAEMIAS (1 h.)

Secondary acute leukaemias. Lymphoproliferative syndromes without hemo-peripheral expression. Lymphomas and myelomas.

THEMATIC UNIT 11. HEMOSTASIS: COAGULATION AND FIBRINOLYSIS (1.5 h.)

Elements that intervene in the hemostasis. Platelets. Plasmatic factors of the coagulation and fibrinolytic system. Analytical tests of the exploration of the different components.

THEMATIC UNIT 12. FUNCTIONAL ALTERATIONS OF THE PLATELETS (1.5 h.)

Thrombocytosis and thrombocytopenia. Alterations of coagulation factors. Haemophilia and Von-Willebran's disease. Anticoagulants and fibrinolytics.

THEMATIC UNIT 13. RENAL FUNCTION: PRINCIPLES OF THE RENAL CLEARANCE (1 h.)

Methods to determine the renal clearance. Measures of glomerular filtration, renal blood flow and effective renal plasma flow. Tubular function tests. Dilution and concentration tests.

THEMATIC UNIT 14. EXAMINATION OF THE ACID-BASE BALANCE (1 h.)

Arterial gasometry. Interpretation of information in respiratory and metabolic acidosis. Respiratory and metabolic alkalosis. Effects of compensation.

THEMATIC UNIT 15. CEPHALORAQUID LIQUID (1 h.)

Formation, circulation and composition. Obtaining sample. Cells count and leucocitary formula. Biochemical tests



THEMATIC UNIT 16. SEMINAL FLUID (1 h.)

Formation. Withdrawal of semen. Macroscopic and microscopic examination. Cellular count and tint. Functional tests

LABORATORY PRACTICE PROGRAM

Practice 1. Blood cells count: red cells, white cells and platelets

Practice 2. Hemoglobin determination. Hematocrit. Erythrocyte indices.

Practice 3. Leucocitary formula.

Practice 4. Reticulocyte count.

BLOCK II. CLINICAL BIOCHEMISTRY

THEMATIC UNIT 1. CLINICAL BIOCHEMISTRY.

Diagnostic semiology. Analytical and biological variability control.

THEMATIC UNIT 2. HYPERGLYCEMIA AND HYPOGLYCEMIA. Diagnosis and monitoring of the diabetic patient.

THEMATIC UNIT 3. LIPOPROTEINS. Evaluation of the atherogenic risk.

THEMATIC UNIT 4. ALTERATIONS OF THE NON-PROTEIN NITROGENOUS METABOLISM: urea, uric and creatinin. Pathological consequences and diagnostic techniques. Non-protein nitrogenous and renal function

THEMATIC UNIT 5. DISPROTEINEMIAS AND DIAGNOSTIC TECHNIQUES.

THEMATIC UNIT 6. CLINICAL ENZYMOLOGY.

THEMATIC UNIT 7. BIOCHEMICAL RISK MARKERS OF THE HEPATIC FUNCTION

THEMATIC UNIT 8. TUMORAL BIOCHEMICAL RISK MARKERS

THEMATIC UNIT 9. HEREDITARY DISEASES.

THEMATIC UNIT 10. BIOCHEMICAL ASSESSMENT IN DIFFERENT PHYSIOLOGICAL SITUATIONS.

THEMATIC UNIT 11. TESTING BIOCHEMISTRY OF PARTICULAR RELEVANCE IN PEDIATRICS, GERIATRICS AND IN PREGNANCY.

LABORATORY PRACTICE PROGRAM

Practice 1. Glucose, total cholesterol, HDL-cholesterol and triacylglycerides determination

Practice 2. Practice 3. Uric acid, urea and creatinin determination

Practice 4. GPT and GOT determination

READING

FUNDAMENTAL BIBLIOGRAPHY:



- KAUSHANSKY K, LICHTMAN MA, PRCHAL J, LEVI MM, PRESS OV, BURNS LJ, CATIGLURI MA. *Williams, Manual de Hematología*. 9ª Edición. Editorial MC Graw-Hill. Interamericana. 2016.
- LICHTMAN MA, KAUSHANSKY K, KIPPS TJ, PRCHAL JT, LEVI MM. *Williams, Manual de Hematología*. 8ª Edición. Editorial MC Graw-Hill. Interamericana. 2014.
- MUNDT, L. A. y SHANAHAN, K. GRAFF, *Análisis de orina y de los líquidos corporales*. Editorial Médica Panamericana, 2011.
- PRIETO VALTUEÑA JM, YUSTE ARA JR. *Balcells. La clínica y el laboratorio*. 22ª Edición. Editorial Elsevier Masson, Barcelona, 2015.
- PROVAN, D. *Manual de Hematología Clínica*. 4ª edición. Editorial Elsevier, 2017.
- RODAK BF., FRITSMA, KEOHANE. *Hematología. Fundamentos y aplicaciones clínicas*. 4ª Edición. Editorial Médica Panamericana. 2014.
- RUIZ ARGÜELLES G. J. *Fundamentos de Hematología*. 5ª Edición. Editorial Médica Panamericana, Madrid, 2014.
- RUIZ REYES G. y RUIZ ARGÜELLES A. *Fundamentos de Interpretación Clínica de los Exámenes de Laboratorio*. 3ª Edición. Editorial Médica Panamericana, Madrid, 2017.
- SANS-SABRAFEN J., BESSES RAEBEL C., VIVES CORRONS J.L. *Hematología Clínica*. 5ª Edición. Editorial Elsevier. Barcelona, 2006.
- STRASINGER S.K. & DI LORENZO M.S. *Análisis de orina y de los líquidos corporales*. 6ª Edición. Editorial Médica Panamericana, Madrid, 2016.
- VIVES J. L., AGUILAR J. L. *Manual de Técnicas de Laboratorio en Hematología*. 4ª Edición. Editorial Elsevier España. Barcelona, 2014.
- Gaw, Cowan, O´Reilly, *Bioquímica Clínica*. Ed Harcourt
- Ruiz Reyes, Ruiz Argüelles. *Fundamentos de interpretación clínica de los exámenes de laboratorio*. Ed Panamericana
- González de Buitrago JM, Arila Ferreira A, Rodríguez-Segade M, Sánchez Pozo A. *Bioquímica Clínica*. McGraw-Hill / Interamericana de España
- Sánchez de Medina Contreras F, Sánchez Pozo A, Suárez Ortega MD. *Apuntes de Bioquímica Clínica*. ICE, Universidad
- González A. *Principios de Bioquímica Clínica y Patología Molecular*. Elsevier España 2010
- Marshall WJ, Bauyert S & Lapsley M. "Bioquímica Clínica". Elsevier Mosby, 7ª Edición, 2013

COMPLEMENTARY BIBLIOGRAPHY:

- ALTHOF, S, KINDLER J, HEINTZ R. *El sedimento urinario: atlas, técnicas de estudio, valoración*. 6ª Edición. Editorial Panamericana, 2010.
- *Diccionario terminológico de Ciencias Médicas*, 13ª ed. Editorial Masson. Barcelona, 2002.
- GIL, J. L. *Hematología sin microscopio: el hemograma en la práctica clínica*, 1ª ed., Masson, 2003.
- RODAK BF, CARR JH. *Atlas de Hematología Clínica*. 4ª Edición. Editorial Médica Panamericana. Madrid, 2014.
- WEKSLER BB, SCHECHTER GP, ELY S. *Wintrobe's Atlas of Clinical Hematology*. 2ª edition. Wolters Kluwer, 2017.

RECOMMENDED INTERNET LINKS

- Anemia_Pathophysiology, Classification, Clinical Investigation
<http://oxfordmedicine.com/view/10.1093/med/9780199204854.001.1/med-9780199204854->



chapter-220502

- Anemias <https://medlineplus.gov/spanish/ency/article/000560.htm>
- ASH Educational Materials <http://labmed.hallym.ac.kr/hematol/ASH-Edu.htm>
- Interactive Basic Hematology <https://hemeteam.com/>
- The Medical Biochemistry <http://web.indstate.edu/thcme/mwking/blood-coagulation.html#intro>
- Blood_Outline <https://es.scribd.com/document/106071429/Blood-Outline>
- Bloodline <http://www.bloodline.net/>
- Hematology Links - Atlas and Slides <http://www.hematologyatlas.com/principalpage.htm>
- Hematology, MedMark <http://www.medmark.org/hem/hem2.html>
- Hematopathology Index Medscape http://www.medscape.com/index/section_154_0
- HemoSurf <http://www.aum.iawf.unibe.ch/vlz/bwl/Haematologie/index.htm>
- American Society of Haematology <https://www.ashacademy.org/Product/TeachingCasesList>

<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

<http://www.biorom.uma.es/indices/index.html> (Página con contenidos relacionados con Bioquímica y especialmente metabolismo. Incluye presentaciones de clase, problemas y preguntas tipo test)

http://expasy.org/cgi-bin/show_thumbnails.pl ; <http://www.genome.jp/kegg/pathway.html> ;

<http://www.sigmaaldrich.com/life-science/metabolomics/learning-center/metabolic-pathways.html>

(Páginas que contiene información de rutas y mapas metabólicos, clasificados por diferentes tipos de metabolismo)

Información sobre la asignatura puede ser consultada en la página web del Departamento de Bioquímica y Biología Molecular II: <http://farmacia.ugr.es/BBM2/>.

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.

