



Universitat de Lleida

DEGREE CURRICULUM

CLINICAL BIOCHEMISTRY

Coordination: HERREROS DANES, JUDIT

Academic year 2023-24

Subject's general information

Subject name	CLINICAL BIOCHEMISTRY			
Code	101530			
Semester	2nd Q(SEMESTER) CONTINUED EVALUATION			
Typology	Degree	Course	Character	Modality
	Bachelor's Degree in Biomedical Sciences	3	OPTIONAL	Attendance-based
Course number of credits (ECTS)	6			
Type of activity, credits, and groups	Activity type	PRALAB	PRAULA	TEORIA
	Number of credits	0.8	0.5	4.7
	Number of groups	2	1	1
Coordination	HERREROS DANES, JUDIT			
Department	BASIC MEDICAL SCIENCES			
Important information on data processing	Consult this link for more information.			
Language	Catalan/Spanish			

Teaching staff	E-mail addresses	Credits taught by teacher	Office and hour of attention
CABISCOL CATALA, ELISA	elisa.cabiscol@udl.cat	1	
HERREROS DANES, JUDIT	judit.herrerros@udl.cat	4,3	
PICO FORNIES, SILVIA		0	
ROS SALVADOR, JOAQUIN	joaquim.ros@udl.cat	1,5	

Subject's extra information

Teachers are fully available for **tutoring on the subject** and other issues related to the BSc studies, after being contacted by e-mail to fix an appointment.

Learning objectives

Describe the general principles of clinical biochemistry in diagnosis.

Describe the biochemical processes and their relevance in human pathology.

Distinguish the applications of clinical biochemistry in diagnosis and pathology monitoring.

Apply the gender perspective to the tasks of the professional field

Competences

CB1 That students have demonstrated that they have and understand knowledge in an area of study that is based on general secondary education, and is usually found at a level that, while supported by advanced textbooks, also includes some aspects that involve knowledge from the forefront of their field of study

CB2 That students know how to apply their knowledge to their work or vocation in a professional way and possess the skills that are usually demonstrated through the development and defense of arguments and problem solving within their area of study

CG5 Apply the gender perspective to the tasks of the professional field

Subject contents

1. Introduction to Clinical Biochemistry. Collection and preparation of specimens. Reference values, biological variability. Variability metrology. Precision, accuracy and sensitivity. Detection limit. Interpretation of results.

2. Analytical Methodology. Techniques and general methods (electrophoretic methods, chromatography, spectroscopy). Immunoassays: technique of ELISA and modalities.
3. Water and electrolytes. Alterations in plasma concentration of sodium and potassium. Acid-base balance. Buffer systems. Acidosis and alkalosis. Plasma calcium. Blood gases. Hemoglobin and hemoglobin disorders thalassemia.
4. Glucose homeostasis. Regulatory hormones. Diabetes mellitus (DM): classification and diagnostic criteria. Glucose tolerance test. Gestational diabetes. Symptoms, causes and consequences of hyperglycemia. Possible long-term complications of DM. Treatment of type 1 and 2 DM determination of glucose in biological liquids. Clinical importance of lactate and ketones. Anomalies of intestinal metabolism of carbohydrates: intolerance due to deficiencies in disaccharidases. Tests of detection. Inborn errors of metabolism of carbohydrates: glycogenopathies. Abnormalities in the metabolism of galactose: galactosemia. Abnormal metabolism of fructose: fructosúria essential and fructose intolerance.
5. Composition and metabolism of plasma lipoproteins. Separation of lipoproteins. Dyslipidemia. Fredrickson classification. Cholesterol levels and cardiovascular risk. Hypertriglyceridemia. Control of dyslipidemia: criteria for establishing dietary treatments and / or drug. Based therapies in controlling LDL cholesterol, HDL-cholesterol. Relationship with atherosclerosis: basic mechanisms of formation of atherosclerotic plaque. Markers for the diagnosis of heart attack.
6. Plasma proteins: albumin, immunoglobulins, fibrinogen, complement factors. Changes in plasma proteins. Proteinogram. Protein in urine. Coagulation factors. Study of hemostasis and fibrinolysis. Coagulation disorders: von Willebrand disease, vitamin K deficiency and hemophilia.
7. Metabolism of nitrogen compounds: amino acids and nucleotides. Diagnostic value of transaminases and gamma-glutamyltransferase other liver enzymes. Urea cycle defects and abnormalities that cause hyperammonemia. Alterations of metabolism of amino acids and creatine creatinine. Metabolic alterations púriques bases. Urate: removal and determination. Hipouricèmia and hyperuricemia. Congenital disorders of the metabolism of purines. Deficiencies in the metabolism of nucleotides pirimidínics.
8. Iron: absorption, transport and utilization. Control of intracellular iron levels. Disorders of iron metabolism. Hemochromatosis. Control of iron systemic role of hepcidin. Determination of total iron and TIBC: diagnostic value. Heme synthesis. Alterations synthesis: Porphyria: types and consequences of heme degradation. Bilirubin: education and transportation. Total and direct bilirubin: determination and diagnostic value. Jaundice: pre-hepatic intra-hepatic and post-hepatic baby. Syndromes of bilirubin metabolism.

Methodology

- Lectures. Whose purpose is to present and explain the theoritical content, emphasizing those aspects that will be useful for the training of the student.
- Seminars and clinical cases. The seminars are designed to extend on concepts presented in lectures and/or apply the concepts in solving clinical cases.
- Laboratory practicals. The lab work is intended for students to apply their knowledge in practicing the calcution of biochemical parameters clinically relevant, and to complement the theoretical concepts presented in the lectures. There will be four practicals: 1) a visit to the clinical analysis laboratory of the Hospital Arnau de Vilanova, 2) an study of renal function, 3) obtaining determinations of uric acid and creatine kinase activity, and 4) determination of bilirubin and liver enzymes.

Development plan

Tema 1. Introduction to Clinical Biochemistry. (Judit Herreros)

Tema 2. Analytical Methodology. Immunoassay (Judit Herreros)

Tema 3. Water and electrolytes. Acidosis and alkalosis. Hemoglobin (Judit Herreros).

Tema 4. Homeostasis of glucose. Diabetes mellitus (DM). (Elisa Cabiscot).

Tema 5. Metabolism of lipoproteins Cholesterol-LDL and cholesterol-HDL. Atherosclerosis and infarct (Joaquim Ros).

Tema 6. Plasma proteins: albumin, immunoglobulins. Proteinograms. Proteins in urine. Coagulation. Hemostasis and fibrinolysis (Judit Herreros y Silvia Picó).

Tema 7. Metabolism of nitrogen compounds . Diagnostic value of hepatic enzymes . Defects of urea cycle. Creatinine and creatinin. Metabolism of purines. Urate. Metabolism of pyrimidinic nucleotides (Judit Herreros).

Tema 8. Iron: Absorption, transport and use. Control. Hemochromatosis. Hepcidin. Total iron and TIBC. Synthesis of heme group. Bilirubin, total and direct. Jaundice, types (Joaquim Ros).

Evaluation

-Theory (65%): 1st part: 30%; 2nd part: 35%.

-Exam on seminars and lab practicals (18%).

-Exam on clinical cases (17%)

You can only recover the corresponding part of the theory in a 2nd opportunity exam.

The theory must be passed with a grade > 5 to average with the other parts.

The student who decides to present a recovery exam will be marked with the grades corresponding to the last exam.

Alternative evaluation: Students taking advantage of the alternative evaluation (for family or work conciliation) will be examined of all the blocks on the day scheduled for the exam of the 2nd partial and the mark of this evaluation will suppose 100% of the mark of the subject.

The composition of this exam will be 30% theory block of the 1st partial, 35% theory block of the 2nd partial, 18% content of seminars and of the practice dossier and 17% clinical cases.

Bibliography

BIOQUÍMICA MÉDICA. JW. Baynes, MH Dominiczak. 4a ed. 2015. Ed. Elsevier.

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EL LABORATORIO EN EL DIAGNÓSTICO CLÍNICO. JB Henry. Volumes 1 i 2. 2005. Marbán Libros.

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