COURSE DATA

DATA SUBJECT

Code: 33063
Name: Clinical biochemistry
Cycle: Undergraduate Studies
ECTS Credits: 5
Academic year: 2025-26

STUDY (S)

Degree	Center	Acad. year	Period
1100 - Degree in Biology	Facultat de Ciències Biològiques	4	First quarter

SUBJECT-MATTER

Degree	Subject-matter	Character
1100 - Degree in Biology	Fundamentals of health biology	ELECTIVES

COORDINATION

GALAN ALBIÑANA AMPARO

SUMMARY

Introduction to Clinical Biochemistry is, together with ¿Diseases and Pathogens¿, "Endocrinology¿, ¿Human Genetics¿, ¿Immunology¿ and ¿Neurobiology¿ each of which having 5 ECTS credits, included on the fourth course of the Biology degree of de Universitat de Valencia.

Clinical Biochemistry is an applied science that investigates biochemical alterations produced by illnesses in homeostatic maintenance. It uses laboratory analysis, whose objective is to know how organs and systems work, under normal and pathological conditions, therefore, it can help diagnostics, prognostics, evolution control, treatments, medicines monitorization and illness¿ prevention.

This subject allows the student to know analysis methods for health evaluation and, as a result, understand its applications and its limits.

PREVIOUS KNOWLEDGE

RELATIONSHIP TO OTHER SUBJECTS OF THE SAME DEGREE

There are no specified enrollment restrictions with other subjects of the curriculum.

OTHER REQUIREMENTS

To take this course the student should have knowledge of: structure and function of biomolecules, regulation and integration of metabolism, Genetics and Molecular Biology, Animal Physiology, biochemical methodology, knowledge of English (translation).

COMPETENCES / LEARNING OUTCOMES

1100 - Degree in Biology

Apreciación del rigor, el trabajo metódico, y la solidez de los resultados.

Aprendizaje autónomo y adaptación a nuevas situaciones.

Capacidad de análisis crítico de textos científicos.

Capacidad de elaborar artículos, informes o proyectos y de exponerlos a diferentes auditorios.

Capacidad de organización, planificación y gestión de la información usando bases de datos bibliográficas adecuadas.

Capacidad de resolución de problemas y toma de decisiones.

Capacidad de utilización de herramientas matemáticas y estadísticas.

Conocer los mecanismos de interacción hospedador-patógeno para entender factores de virulencia en enfermedades infecciosas y parasitarias.

Conocer los organismos patógenos de humanos, las patologías que provocan y conocer los fundamentos de las principales estrategias terapéuticas.

Conocer los principales métodos y técnicas experimentales aplicadas al estudio de las enfermedades humanas, su etiología y la efectividad de los tratamientos.

Conocer y saber aplicar el método científico.

Conocimiento de las enfermedades y disfunciones más frecuentes durante las distintas etapas de la vida.

Entender la genómica de patógenos y sus implicaciones para el diseño de fármacos y vacunas.

Potenciar la creatividad, iniciativa y espíritu emprendedor.

Reflexión ética sobre la actividad profesional.

Saber diseñar y preparar vacunas y saber realizar las vacunaciones.

Utilización del vocabulario específico de la Biología sanitaria.

DESCRIPTION OF CONTENTS

1. Clinical biochemistry

Concept. Specimens types. Collection and preparation of biological samples. Storage and conservation.

2. Interpretation of results

Analytical quality. Values of reference. Semiological value of the biochemical determinations. Interferences

3. Analytical methods in the Clinical Biochemistry laboratory

Spectrophotometry. Chromatography, electrophoresis. Immunological techniques. Techniques of Molecular Biology.

4. Plasma proteins. Proteins in urine.

Study of plasma proteins. Biochemical functions and clinic interest. Proteinuria. Protein identification methods. Clinical applications

5. Clinical enzimology

Diagnostic value of plasma enzymes and isoenzymes

6. Alterations of sugar metabolism.

Metabolism of Galactose, Fructose,Lactose. Glycogenosis.

7. Diabetes mellitus

Differential study and complications. Study of hypoglycemia. Metabolic Syndrome

8. Alterations and evaluation of plasma lipoproteins

Biochemical diagnosis of lipoproteins disorders . Biochemical markers of the myocardial infarction.

9. Alterations and evaluation of the nitrogen metabolism

Clinical study of urea and creatinine. Study of the renal clearance.

10. Disorders of the nitrogen metabolism: Purines.

Clinical study and biochemical evaluation of hyperuricemia

11. Heme metabolism

Biochemical evaluation of the jaundices and of the porphyrias.

12. Iron metabolism

Biochemical evaluation of the anaemias and the hemochromatosis.

13. Molecular Base of Celiac Disease.

Definition. Clinical manifestations. Etiopathogenesis.

14. Clinical Biochemistry of the bone

Metabolism of the calcium, phosphorus and magnesium

16. PRACTICAL SESSIONS

1.- Types of Specimens, sampling, containers, conservation, interferences, etc.

2.- Determination of metabolites and ions. Glucose. Urea. Uric acid. Total hemoglobin. Iron. Iron binding capacity (TIBC). Creatinine: Creatinine clearance. Cholesterol, HDL-Cholesterol: Assessment of atherogenic risk. Triglycerides. Study of plasma proteins..

3.- Determinations of enzymes and isoenzymes of clinical interest. Glutamate-Oxaloacetate Transaminase (ASAT). Glutamate-Pyruvate Transaminase (ALAT). Gamma glutamyl transpeptidase (GGT). Serum phosphatases Alkaline. Lactate dehydrogenase total (LDH) and heat resistant. Amylase.

4.-Discussion and interpretation of results. Simulation of clinical cases and reporting.

WORKLOAD

PRESENCIAL ACTIVITIES

Activity	Hours
Tutorials	2,00
Theory	33,00
Laboratory	15,00
Total hours	**50,00**

NON PRESENCIAL ACTIVITIES

Activity	Hours
Attendance at other activities	0,00
Individual or group project	15,00
Independent study and work	0,00
Preparation of lessons	11,50
Preparation for assessment activities	43,50
Resolution of case studies	5,00
Total hours	**75,00**

TEACHING METHODOLOGY

The course will be based on the following teaching methods:

1.- Theoretical classes: sessions of 1 hour using the methodology of the lecture as , well as the use of spoken presentations for on-line classes or the use of videoconference-

2.- Practical classes: based on practical activities both in the laboratory and in simulation of clinical cases and reporting. The practical classes will be face-to-face.

3.- Tutorials and Seminars: It will review issues of interest to the student's formation in the field of clinical biochemistry, such as single topics, case reports, etc. The realization of the tutorials and seminars will be carried out on-line

EVALUATION

1.- Evaluation of the theoretical content:

Theory exam: 65% of the student's final qualification (65 points)
An evaluation of the concepts worked on the theory sessions consisting of multiple choice questions and short and developmental issues.

2. – Evaluation of practices: 20% of the final grade (20 points)

Practices exam: theoretical questions about basics of techniques and clinical usefulness of determinations and calculation problems of some biochemical parameters and interpretation of results. (15 points)

5 points of the practical note will be obtained from exercises and evaluable tasks of the same.

3: - Continuous assessment tasks: 15% of the final grade (15 points)

During the semester, various tasks were carried out on aspects of the temary, topics of current interest in clinical biochemistry, etc.

4.- To pass the course it will be necessary to pass each of the sections separately

A student who does not pass the subject in the first call you can save for the second call that part that has passed.

REFERENCES

- BALCELLS, A. La Clínica y el Laboratorio. 22ª ed. Editorial Masson. (2015).
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- BURTIS,C.A. & ASHWOOD,E.R. (Eds.) "TIEZ textbook of Clinical Chemistry" 4ª ed. Elsevier-Saunders Company (2006).
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- GONZALEZ HERNANDEZ, ALVARO. Principios de Bioquímica Clínica y Patología Molecular. 2 Ed Editorial Elsevier. (2016).

- HENRY, J.B. Clinical diagnosis and management by laboratory methods 3ª ed Saunders Co. (2005).

- KASPER, D.L. et al. Harrison: Principios de Medicina Interna. McGraw-Interamericana 16ª Ed. (2006).

- MARSHALL, W.J. & BANGERT, S.K. Clinical Chemistry. Metabolic and clinical aspects. Curchill Livingstone. (2008).