

**COURSE DATA****Data Subject**

Code	33063
Name	Clinical biochemistry
Cycle	Grade
ECTS Credits	5.0
Academic year	2017 - 2018

Study (s)

Degree	Center	Acad. year	Period
1100 - Degree in Biology	Faculty of Biological Sciences	4	First term

Subject-matter

Degree	Subject-matter	Character
1100 - Degree in Biology	16 - Fundamentals of health biology	Optional

Coordination

Name	Department
GOMEZ GARCIA, MARIA MICAELA	30 - Biochemistry and Molecular Biology
MURGUI FAUBEL, MARIA AMELIA	30 - Biochemistry and Molecular Biology

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

In order to study it, learners must have some knowledge about biomolecules functions and structure, metabolism integration and regulation, Molecular Genetics and Biology, animal physiology, biochemical methodology and scientific English.

OUTCOMES

1100 - Degree in Biology

- Conocer y saber aplicar el método científico.
- Capacidad de organización, planificación y gestión de la información usando bases de datos bibliográficas adecuadas.
- Utilización del vocabulario específico de la Biología sanitaria.
- Capacidad de resolución de problemas y toma de decisiones.
- Capacidad de elaborar artículos, informes o proyectos y de exponerlos a diferentes auditorios.
- Capacidad de análisis crítico de textos científicos.
- Aprendizaje autónomo y adaptación a nuevas situaciones.
- Potenciar la creatividad, iniciativa y espíritu emprendedor.
- Apreciación del rigor, el trabajo metódico, y la solidez de los resultados.
- Capacidad de utilización de herramientas matemáticas y estadísticas.
- Reflexión ética sobre la actividad profesional.
- Conocer los principales métodos y técnicas experimentales aplicadas al estudio de las enfermedades humanas, su etiología y la efectividad de los tratamientos.
- Conocimiento de las enfermedades y disfunciones más frecuentes durante las distintas etapas de la vida.
- Conocer los organismos patógenos de humanos, las patologías que provocan y conocer los fundamentos de las principales estrategias terapéuticas.
- Conocer los mecanismos de interacción hospedador-patógeno para entender factores de virulencia en enfermedades infecciosas y parasitarias.



- Saber diseñar y preparar vacunas y saber realizar las vacunaciones.
- Entender la genómica de patógenos y sus implicaciones para el diseño de fármacos y vacunas.

LEARNING OUTCOMES

The main objective of the course is that the student knows the biochemical alterations introduced by the disease in the body's homeostasis.

Objectives:

- Understanding the biochemical mechanism of the disease and its rational approach to diagnosis, prognosis, treatment and prevention.
- Understanding the main techniques and analytical methods used in the diagnosis and monitoring of certain diseases.
- Give the students a vision of clinical chemistry as a science of everyday, useful in both the laboratory and in medical practice.
- Integrating knowledge of basic science to clinical practice.
- Understanding that the maintenance of our internal homeostasis depends on the balance between our internal metabolism and our environment.

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. Semiologic 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.

Protein identification methods. Clinical applications

5. Clinical enzymology

Diagnostic value of plasma enzymes and isoenzymes

6. Glucose metabolism

Diabetes mellitus. Concept, diagnostic, classification, complications. Study of the hypoglycemia. Metabolic syndrome.

7. Alterations and evaluation of plasma lipoproteins

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

8. Alterations and evaluation of the nitrogen metabolism

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

9. Disorders of the nitrogen metabolism: Purines.

Clinical study and biochemical evaluation of hyperuricemia

10. Heme metabolism

Biochemical evaluation of the jaundices and of the porphyrias.

11. Iron metabolism

Biochemical evaluation of the anaemias and the hemochromatosis.



12. Clinical Biochemistry of the bone

Metabolism of the calcium, phosphorus and magnesium

13. Clinical Biochemistry of the thyroid function

Analytical study of the Hypothyroidism and Hyperthyroidism

14. Biochemical diagnostic of cancer

Tumor markers

15. LABORATORY 1. Sampling and metabolites determination

- Sampling, recipients, processing and conservation.
- Glucose : diabètic Control
- Urea : Serum and Urine
- Uric: Serum and Urine
- Hemoglobin
- Results interpretation.

16. LABORATORY 2. Metabolites and Ions determination. Enzymes

- Iron evaluation (study of anaemias and hemochromatoses)
- Bilirubine
- Creatinine in serum and urine. Renal clearance.
- Phosphorus and calcium metabolism. Study in serum and urine.
- Amylase in serum and urine
- Results and discussion

17. LABORATORY 3. Lipids and proteins determination.

- Cholesterol Total
- HDL-cholesterol
- LDL-cholesterol
- Triglycerides
- Atherogenic risk
- Plasma proteins determination
- Urine proteins determination
- Results and discussion

**18. LABORATORY 4. Clinical enzymology**

- Glutamate-Oxolacetate Transaminase (ASAT) GOT
- Glutamate-Piruvate Transaminase (ALAT). GPT
- -glutamyl -transpeptidase (GGT): kinetical Measure
- Alkaline phosphatase.
- Lactate dehydrogenase (LDH): Total and heat-resistant
- Results and discussion

19. LABORATORY 5. Integration of results.

- Integration of results
- Final Report
- Simulation of clinical cases

WORKLOAD

ACTIVITY	Hours	% To be attended
Theory classes	26,00	100
Laboratory practices	22,00	100
Tutorials	2,00	100
Development of group work	20,00	0
Study and independent work	40,00	0
Readings supplementary material	3,00	0
Preparation of evaluation activities	2,00	0
Preparing lectures	8,00	0
Preparation of practical classes and problem	2,00	0
TOTAL	125,00	

TEACHING METHODOLOGY

The teaching methods used in this course will be:

1 .- Theoretical classes: 19 sessions of 1 hour using the methodology of the lecture.

2 .-Practical classes: based on practical activities in the laboratory and in simulation of clinical cases and reporting.



3.- Tutorials and Seminar: It will review issues of interest to the student's formation in the field of clinical biochemistry, such as single topics, case reports, etc..

EVALUATION

1. - Evaluation of the theoretical content

2.

Theory exam: 70% of the student's final qualification (70 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)

Theoretical questions about basics of techniques and clinical usefulness of determinations and calculation problems of some biochemical parameters and interpretation of results.

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

Class attendance is mandatory in practical sessions, NON-COMPLIANCE with this rule will prevent to pass the course.

To compensate for theory and practical note, you need to obtain a minimum of 30 points out of 70 in theory and in practice 9 out of 20

3 - Seminars / tutorials. 10%. (10 points).

1. - Final evaluation. It will be the total of the practice note, the note theory and tutoring / seminars.



To pass the course you must obtain an overall rating of over 50 100.

REFERENCES

Basic

- GONZALEZ HERNANDEZ, ALVARO. Principios de Bioquímica Clínica y Patología Molecular. Editorial Elsevier. 2010.
- SMITH, C., MARKS, A. D. Y LIEBERMAN, M. Bioquímica basica de Marks- un enfoque clínico. 2ª ed. McGraw-Hill. (2006).
- SCRIVER, C.R. et al. The metabolic and molecular bases of inherited disease vol. I, II, III y IV. McGraw-Hill (2001).
- KASPER, D.L. et al. Harrison: Principios de Medicina Interna. McGraw-Interamericana 16ª Ed. 2006. On-line a través de la UV
- GAW, A. et al. Bioquímica Clínica 2ª ed. Harcourt (2001).

Additional

- MARSHALL, W.J. & BANGERT, S.K. Clinical Chemistry. Metabolic and clinical aspects. Curchill Livingstone. (2008).
- ANGEL, M.G. Diccionario del Laboratorio Clínico Editorial Médica Panamericana 3 Ed. (2005)
- BALCELLS, A. La Clínica y el Laboratorio. 20ª ed. Editorial Masson. (2006).