COURSE DATA

DATA SUBJECT

Code: 34090
Name: Clinical Biochemistry and Hematology
Cycle: Undergraduate Studies
ECTS Credits: 6
Academic year: 2025-26

STUDY (S)

Degree	Center	Acad. year	Period
1201 - Degree in Pharmacy	Facultat de Farmàcia i Ciències de L'alimentació	4	Sin determinar, Second quarter
1211 - Double Degree in Pharmacy and Human Nutrition and Dietetics	Facultat de Farmàcia i Ciències de L'alimentació	4	Sin determinar, Second quarter

SUBJECT-MATTER

Degree	Subject-matter	Character
1201 - Degree in Pharmacy	Clinical analysis and laboratory diagnostics	COMPULSORY
1211 - Double Degree in Pharmacy and Human Nutrition and Dietetics	Asignaturas obligatorias del PDG Farmacia-Nutrición Humana y Dietética	COMPULSORY

COORDINATION

ESTORNELL RAMOS ERNESTO

SASTRE BELLOCH JUAN JOSE

SUMMARY

The matter comprises part of the vast field of the biological analyses applied to the diagnostic and follow-up of the human illnesses. It is divided in two areas of knowledge: Clinical Biochemistry and Hematology.

The Clinical Biochemistry is an applied science that accomplishes the study of the biochemical alterations that the illness triggers in the maintenance of the homeostatic constants. For this, it is supported by tests of laboratory that allow us understand the true operation of organs and systems, discern the pathological variations and help, therefore, to the diagnostic, prognosis, control of the evolution, treatment, monitoring of drugs and prevention of the illness.

The Hematology addresses the study of the diagnostic of the pathological processes that produce alterations in the diverse types of blood cells, comprising so much the diagnostic of the different anemia as

well as poliglobulies, thrombotic phenomena and alterations of the leucocytes.

PREVIOUS KNOWLEDGE

RELATIONSHIP TO OTHER SUBJECTS OF THE SAME DEGREE

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

OTHER REQUIREMENTS

It is specially recommended to demonstrate previous knowledge corresponding to the subjects of Biochemistry I, Biochemistry II, Physiology and Physiopathology, in addition to instrumental methods and techniques, to obtain the own level of conceptual understanding of the subject, in addition to the obvious knowledge of the basic matters, like chemistry, physics, mathematics and biology.

COMPETENCES / LEARNING OUTCOMES

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Acquire and develop the skills necessary for the proper handling of all inventory and consumable materials used in diagnostics.

Act with autonomy in learning, making informed decisions in different contexts, issuing judgements based on experimentation and analysis, and transferring knowledge to new situations.

Address analytical problem-solving in an interdisciplinary manner with other professionals.

Apply such knowledge to the professional world, contributing to the development of human rights, democratic principles, principles of equality between women and men, solidarity, environmental protection and promotion of a culture of peace with a gender pe

Begin practical performance of microbiological analyses of samples, as well as interpretation of results for laboratory diagnosis.

Collaborate effectively in work teams, assuming responsibilities and leadership roles and contributing to collective improvement and development.

Contribute to the design, development and implementation of solutions that respond to social demands, taking into account the Sustainable Development Goals as a reference.

Demonstrate critical and self-critical thinking in the field of the degree programme, considering aspects such as professional ethics, moral values and the social implications of the different activities carried out.

Design, apply and evaluate reagents, clinical analytical techniques and methods, knowing the basic principles of clinical analyses and the characteristics and content of laboratory diagnostic reports.

Develop future professional awareness of the relevance of the diagnosis to be made.

Develop reasoned argumentation and rational criticism.

Develop skills to update knowledge and undertake further studies, including pharmaceutical specialisation, scientific research, technological development and teaching.

Establish the criteria necessary to arrive at a differential aetiological diagnosis of an infection, and in particular those to be followed for the collection, transport and processing of a specimen in a clinical laboratory.

Know and correctly apply the terminology and specific elements of the microbiology laboratory.

Know and critically manage documentary sources of all kinds within the field of parasitic disease diagnosis.

Know and critically manage documentary sources of clinical biochemistry and haematology within the field of human disease diagnosis.

Know and develop the techniques in clinical biochemistry and haematology for the proper processing of any biological sample suitable for analysis in a clinical biochemistry and haematology laboratory.

Know and understand, within the field of the degree programme, gender inequalities in society; integrate different needs and preferences based on sex and gender into the design of solutions and problem solving.

Know and understand the bases of the methods and techniques used in clinical biochemistry and haematology for disease diagnosis and the principles of their application.

Know how to communicate effectively, both orally and in writing, adapting to the characteristics of the situation and the audience.

Know how to interpret, evaluate and communicate relevant data in the different areas of pharmaceutical activity, using information and communication technologies.

Know the most common infectious processes affecting different organs and systems, and the differential diagnosis of their causes or aetiological agents.

Know the most frequent aetiological agents, their pathogenesis and laboratory diagnosis.

Master parasitological analytical terminology.

Master the techniques necessary for proper parasitological processing of any biological sample suitable for analysis in a parasitology laboratory.

Module: Medicine and Pharmacology. Know and understand the basic principles of clinical analysis and the characteristics and contents of laboratory diagnostic reports.

Perform hygiene and sanitary analyses.

Possess and understand knowledge in the different areas of study included in pharmacist training.

Propose creative and innovative solutions to complex situations or problems within the field of knowledge, to respond to diverse professional and social needs.

Select the most sensitive, reliable and rapid laboratory tests for the diagnosis of a specific infectious disease or for the differential aetiological diagnosis of a specific syndrome.

Transmit ideas, analyse problems and solve them with critical spirit, acquiring teamwork skills and assuming leadership when appropriate.

Understand that any microorganism is usually capable of producing different clinical pictures and that a particular clinical process may be caused by different aetiological agents.

Understand the basics of the methods and techniques used in the diagnosis of parasitic diseases and the principles of their application.

Understand the diagnostic usefulness of each method and technique and know the biological material required for the correct diagnosis of different human parasitic diseases.

Understand the diagnostic usefulness of each method and technique in clinical biochemistry and haematology, assessing their specific use, prognostic value and required complementary tests, considering gender biases in clinical diagnoses.

DESCRIPTION OF CONTENTS

1. Diagnosis of laboratory of the alterations of the red series

- General aspects of the diagnostic of anemia.
- Diagnostic of laboratory of the ferropenic anemia.
- Diagnostic of laboratory of the megaloblastic.
- Diagnosis of laboratory of the hemolytic anemia. Hemoglobinopathia.
- Diagnosis of laboratory of polyglobulia.

2. Diagnosis of laboratory of the alterations of the white series

- Diagnosis of laboratory of the quantitative alterations of the leukocytes.
- Diagnosis differential of the leukocytosis.
- Diagnosis differential of leukopenia.
- Anomalies of hematopoyesis: Aplastic bone marrow and myelodisplastic syndromes
- Diagnosis of laboratory of leukemia.

3. Diagnosis of laboratory of the alterations of hemostasia

- Diagnosis of laboratory of the hemorrhagic diathesis.
- Diagnosis of laboratory of the thrombosis and control of the patient with thrombotic phenomena.

4. Laboratory of Hematology

- Differential hematologic analyzer. Count of reticulocytes.
- Sideremia. Index of hemolysis.
- Leukocite Formula.
- Coagulation.

5. Concepts and interpretation of results in Clinical Biochemistry

Reference population. Decisive values and reference intervals. Interpretation of results. Biomarkers. Distributions of values in populations. Diagnostic sensitivity and specificity. Predictive value of biochemical determinations. ROC curves and comparisons. Limitations of tumor markers.

6. Evaluation and alterations of glycid metabolism

Glycid metabolism: Main causes of alteration. Selection of analytes. Methods and analytical techniques. Differential diagnosis of Diabetes mellitus and hypoglycemia.

7. Alterations and evaluation of plasma lipoproteins

Alterations and evaluation of plasma lipoproteins. Characteristics, origin, function and destiny of plasma lipoproteins. Main alterations of the lipid transport. Methods and analytical techniques. Biochemical diagnosis of hypo- and hyperlipoproteinemias. Evaluation of the aterogenic risk.

8. Alterations and evaluation of nitrogen metabolism

Alterations and evaluation of nitrogen metabolism. Application to the diagnosis of the renal excretion function. Urea, creatinina and proteinurias. Alterations in purine bases metabolism. Biochemical evaluation of hyperuricemias. Analytical methods and techniques.

9. Alterations and evaluation of the bone and mineral metabolism

Alterations and evaluation of the bone and mineral metabolism. Main mineral elements and their hormonal control. Diagnostic implications. Analytical methods and techniques.

10. Clinical Enzymology

Clinical Enzymology. Origin, half-life and plasma concentration. Diagnostic value of enzymes and isoenzymes. Analytical methods and techniques. Interpretation of results of enzyme panels.

11. Plasma proteins.

Main plasma proteins used in Clinical Biochemistry. Functions, metabolism and diagnostic utility. Methods and techniques of analysis. Main tumor markers.

12. Clinical Biochemistry Laboratory

Determination of metabolites:
Glucose
Triacylglycerols
Cholesterol
HDL-cholesterol: lipid balance, evaluation of aterogenic risk
Urea
Creatinine
Proteins

Enzyme activity determinations of clinical interest:

Aspartate aminotransferasa (ASAT)
Alanina aminotransferasa (ALAT)
Alcaline phosphatase (ALP)
Gamma-glutamyl transpeptidase (GGT)

WORKLOAD

PRESENCIAL ACTIVITIES

Activity	Hours
Tutorials	3,00
Theory	30,00
Seminar	2,00
Laboratory	25,00
Total hours	**60,00**

NON PRESENCIAL ACTIVITIES

Activity	Hours
Attendance at other activities	4,00
Individual or group project	4,00
Independent study and work	0,00
Preparation of lessons	82,00
Preparation for assessment activities	0,00
Resolution of case studies	0,00
Total hours	**90,00**

TEACHING METHODOLOGY

The actual hours of theory, raised as a theoretical and practical classes, teacher explain the problems surrounding the diagnosis of diseases, as well as the basic methodology for the correct processing of all and each one of the biological materials liable to be processed in a laboratory dedicated to the diagnosis of diseases. Meanwhile, the students should take notes from the information received, while they should try to ask all those questions and issues that arise at the time. In actual practice hours, activity in the laboratory focuses on two parts: teacher will present the objectives, will inform about the handling of the material, will oversee the completion of the work and help the interpretation of the results; on the other hand, students will be carried out individually or in pairs, the technical procedure. In the hour of tutoring, the student must raise their needs, while the teacher must guide and resolve doubts; alternately the teacher will propose questions and problems to be solved under his/her supervision by the students. All this in order to achieve an adequate technical knowledge of the module. Finally, in the review will be raised a number of issues involving single answer but also issues of reasoning which induce the student to reflect and think about the issue.

EVALUATION

For the evaluation of the learning carried out, the direct verification of the level that the student acquires is considered fundamental, which can be carried out in the set of contact hours, especially and fundamentally with regard to the observation. of the daily work done. This should allow the teacher to directly establish a dynamic image of the evolution of each student throughout the thematic block of each area of ¿¿knowledge.

However, the numerical qualification of the acquired knowledge and skills must be established on the basis of methods that allow a comparable and objective measurement of the same, with registration of results, which implies the qualification of the written test. In this sense, and by means of global theoretical-practical examination of the asignatura, that will consist so much of questions type test, of questions, of questions of development and of practical suppositions, the student has to evidence the competitions and knowledge acquired.

Taking into account the division of the subject between areas of knowledge, the distribution of the score to be obtained by the student has been made in a weighted way to the content of the subject. Therefore, the following evaluation criteria and rules must be taken into account:

1. The two thematic blocks that comprise the subject, Clinical Biochemistry and Hematology, are evaluated in a single final exam out of a total of **90 points**. In this examination are included and scored in an undifferentiated way both the theoretical contents and the practical contents of the subject. Attendance at practical classes is mandatory for all those students who did not take them in any of the three previous courses.

2. The completion of practical classes, as well as tutorials and seminars, is mandatory for all students and, therefore, they are non-recoverable in accordance with what is established in article 6.5 of the Evaluation and Qualification Regulations of the UV for Bachelor's and Master's degrees. If, for a justified reason, it is not possible to attend one of these activities, you must communicate sufficiently in advance so that the coordination of the subject can assign a session or another group, if possible. However, if the laboratory classes have been carried out in the previous three years they will be considered valid at the discretion of the teaching staff.

3. For the final grade, the score obtained in each of the blocks is normalized according to the teaching loads. In this way, the percentage of contribution to the final mark of the 2 thematic blocks will be 40% for Hematology and 60% for Clinical Biochemistry. The subject is approved or suspended globally and once the compulsory activities (practices, seminars and tutorials) have been completed. To pass the subject you must obtain 50% of the total score of the exam, **45 points**, and at least 40% of the score in each of the 2 thematic blocks, according to the following distribution:

	Total Score	50%	40%
Hematology	35.0	17.5	14.0
Clinical Biochemistry	55.0	27.5	22.0

TOTAL	**90.0**	**45.0**	

4. Once you have passed the exam with a score equal to or higher than **45 points** (and at least 40% of the score in both blocks), you can obtain up to a maximum of **10 additional points** (distributed equally between both areas of knowledge) by means of the continuous evaluation by professors of the attitude and the active participation of students in the face-to-face classes, so much theoretical as practical, and of the valuation of the memory of the practical activities. In the case of seminars with oral presentation of topics or other training activities, score will be assessed within these 10 points. These additional assessments will only be applied in those cases in which the examination of the subject has been passed as specified in section 3.

5. The overall grade will be the sum of the weighted scores of the exam as specified in section 3 and the additional assessments specified in section 4, with a total of **100 points** in the overall grade. subject.

6. In the event that in the first call the qualification of suspension has been obtained but one of the blocks is approved with a score equal to or greater than 50% (**17.5 points** for Hematology and **27.5 points** for Biochemistry Clinical), the score will be maintained for the second call within the same academic year, but not if it is less than 50%. Therefore, in this second call it will only be necessary to examine the pending module, but the qualification in the subject will also require compliance with section 3.

7. Evidence of copying or plagiarism, AI included, in any task in the assessment will result in failure to pass the subject and in appropriate disciplinary procedures. It must be taken into account that, in accordance with article 13. d) of the University Student Statute (RD 1791/2010, of December 30), it is the duty of the student to abstain of the use or cooperation in fraudulent procedures in the evaluation tests, in the works that are carried out or in official documents of the university. Fraudulent practices will be dealt with according to the "Protocol of action against fraudulent practices at the University of Valencia" (ACGUV 123/2020): https://www.uv.es/sgeneral/Protocols/C83.pdf

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