VNIVERSITAT DE VALÈNCIA

Course Guide
34089 Microbiological and Parasitological Analyses

COURSE DATA

Data Subject	
Code	34089
Name	Microbiological and Parasitological Analyses
Cycle	Grade
ECTS Credits	6.0
Academic year	2024 - 2025

Study (s)

Degree	Center	Acad. year	Period
1201 - Degree in Pharmacy	Faculty of Pharmacy and Food Sciences	4	First term
1211 - Double Degree in Pharmacy and Human Nutrition and Dietetics	Faculty of Pharmacy and Food Sciences	4	First term

Subject-matter

Degree	Subject-matter	Character
1201 - Degree in Pharmacy	24 - Clinical analysis and laboratory diagnostics	Obligatory
1211 - Double Degree in Pharmacy and Human Nutrition and Dietetics	1 - Asignaturas obligatorias del PDG Farmacia-Nutrición Humana y Dietética	Obligatory

Coordination

Name	Department
ESTEBAN SANCHIS, JOSE GUILLERMO	358 - Pharmacy, Pharmaceutical Technology and Parasitology
IRANZO RODENAS, MARIA	275 - Microbiology and Ecology

SUMMARY

The material covers the vast field of clinical analysis applied to the diagnosis and monitoring of human diseases, from the microbiological point of view and parasitological.
Each of the matter presents particular thematic program, which continues as the main criterion carefully selected to allow the student to have a sufficiently broad broad field of microbiological diagnostic

laboratory tests and parasitological but stressing and focusing on those aspects which by their frequency or relevance will require a better understanding of the student for further professional development. All this, trying that, as particular cases, students can draw conclusions, general operational procedures and ways they can apply later.

A) Microbiological Analysis:

- Introduction to clinical microbiological analysis. Sampling and processing.
- Classical microbiological diagnostic methods.
- Rapid diagnostic techniques: serological and molecular methods.
- Analysis of systemic infections, infectious hepatitis, central nervous system infections, respiratory tract and adjoining regions of the gastrointestinal tract, urinary tract and skin.
- Analysis of sexually transmitted diseases and infections, congenital and perinatal transmission.

B) Parasitological Analysis:

This part of the subject comprises 9 theoretical topics centred on the importance of parasitological analyses and related problems, as well as all aspects concerning the various analytical steps, from taking samples and transport to processing biological samples through suitable techniques for their diagnoses. The final analytical part refers to parasiyological diagnosis based on the knowledge of various parasitic structures. The theoretical part is completed by the practical part, in which students carried out all necessary methods and techniques for the diagnoses of all parasitic structures apt to be microscopically detected.

All in all, the subject focused on diagnostics correlates well with some of the Sustainable Development Goals (SDGs) part of the Agenda 2030. Concretely, the first six SDGs form part of the repercussions parasitic diseases have within the context of the world population. Countries, but particularly tropical and subtropical countries, present a series of parasitic diseases that affect the SDGs. Hence, this subject focused on diagnostics is fundamental in order to face parasitic diseases and, consequently, achieve a more sustainable world, with a better future for all.

In brief, this part of the subject concerns the following points:

- Importance of parasitological analyses for human health;

- Coproparasitological, haemaparasitological, genital-urinary, tissue, aspirate and other body fluid analyses and the corresponding diagnoses;

- Technical studies of arthropods and their diagnoses;

- Specific diagnostic techniques, immune-diagnosis and molecular diagnosis.

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 recommended to have studied the subjects of "Microbiology" and "Parasitology" to access the subject "Parasitological and Microbiological Analysis." The student should also have completed the subject "Immunology" to facilitate the study of the subject.

COMPETENCES (RD 1393/2007) // LEARNING OUTCOMES (RD 822/2021)

1201 - Degree in Pharmacy

- To possess and to understand the knowledge in the different areas of study included in the formation of the pharmacist.
- To apply this knowledge to the professional world, contributing to the development of Human Rights, democratic principles, principles of equality between women and men, solidarity, protection of the environment and promotion of a culture of peace with Gender perspective.
- To know how interpret, value and communicate relevant data in the different aspects of pharmaceutical activity, making use of information and communication technologies.
- Skill to communicate ideas, analyze problems and solve them with a critical mind, achieving team-working abilities and assuming leadership whenever required.
- Development of skills to update their knowledge and undertake further studies, including pharmaceutical specialization, scientific research and technological development, and teaching.
- Designing, implementing and evaluating reagents, clinical analytical methods and techniques, knowing the basics of clinical analyses and the nature and contents of laboratory diagnostic reports.
- Develop health and hygiene analyses
- Knowledge and correct application of the terminology and specific elements of the microbiology laboratory.
- Understand that any organism is usually able to produce different clinical pictures, and a particular clinical process may be caused by different aetiological agents.
- Knowledge of the most common infectious processes that affect different organs and systems, as well as the differential diagnosis of the causes or aetiological agents of each one.
- Knowledge of the most common aetiological agents, pathogenesis and laboratory diagnosis.
- Establish the criteria for the differential aetiological diagnosis of infection, especially those that must be followed when taking, transporting and processing a sample at a clinical laboratory.

- Select from the various laboratory tests the most sensitive, reliable and rapid diagnosis of a particular infectious disease or differential aetiological diagnosis of a given syndrome.
- Initiating the practical realization of the microbiological analysis of samples and interpretation of the results for laboratory diagnosis.
- Mastering parasitological analytical terminology.
- Acquire and develop relevant skills for the correct management of all durable goods and consumables used in the field of diagnostic parasitology.
- Understand the basic methods and techniques used in the diagnosis of parasitic diseases and the fundamentals of their application.
- Mastering the techniques necessary for correct parasitological processing of any biological sample prone to be analyzed at laboratory
- Knowledge of the diagnostic utility of each method and technique as well as of the biological material needed for the correct diagnosis of each of the different human parasites.
- Knowledge and use of documentary sources of all types within the field of diagnosis of microbial diseases and parasites according to ones own judgment.
- Training in addressing analytical results in an interdisciplinary manner with other professionals.
- Development of future professional awareness based on the relevance of the diagnosis made.

LEARNING OUTCOMES (RD 1393/2007) // NO CONTENT (RD 822/2021)

After having completed this course, students should be able to:

- Master of analytical terminology in all fields;
- Acquire and develop skills relevant to the proper management of all durable goods and consumables used in the field of diagnosis;
- Understand the basics of the methods and techniques used in the diagnosis of microbiological and parasitological diseases, and the fundamentals of application;
- Master the skills necessary for proper processing of any biological sample can be analyzed in a clinical laboratory;
- Know the diagnostic utility of each method and technique, assessing what their actual use, the prognostic value and requires additional tests;
- Know the etiologic agents most common microbiological and parasitological, pathogenesis and laboratory diagnosis;
- Choose among various laboratory tests the most sensitive, reliable and rapid diagnostic of a particular disease or etiologic differential diagnosis of a given syndrome;
- Know and manage standard documentary sources of all types within the field of diagnosis of human diseases;
- Ability to argumentation based and rational criticism;
- Ability to deal with the resolution of the analytical interdisciplinary with other professionals;
- Develop future professional awareness about the relevance of the diagnosis to be made.
- Correlating the diagnostic techniques of parasitic diseases with the first six Sustainable Development Goals (SDGs) part of Agenda 2030.

DESCRIPTION OF CONTENTS

1. Microbiological laboratory tests. Sampling and processing.

Laboratory diagnosis of infectious diseases. Collecting and transporting samples for microbiological analysis. Regulations governing clinical laboratories.

2. Classical microbiological diagnostic methods.

Methods for culture and isolation of microorganisms. Culture media: types. ID: Microscopic examination of bacteria. Staining. Biochemical tests. Determination of the susceptibility of bacteria to antimicrobial agents. Antibiogram. Interpretation.

3. Rapid diagnostic techniques: serological and molecular methods.

Immunological techniques, agglutination, precipitation reactions and complement fixation. Immunoassay techniques. Immunofluorescence. Molecular diagnostic methods, nucleic acid hybridization, PCR, etc..

4. Systemic infections.

Septicemia. Infective endocarditis. Relapsing fever and Lyme disease. Typhoid. Leptospirosis. Brucellosis. Mycoses.

5. Infectious hepatitis.

Etiology. Study of the serological markers used.

6. Central nervous system infections.

Etiology. Acute bacterial meningitis. Chronic meningitis. Meningitis in the neonate.

7. Upper respiratory tract infections and adjoining regions.

The common cold. Viral pharyngitis and tonsillitis and bacterial infections. Infectious mononucleosis. Sinusitis. Diphtheria. Infections of the oral cavity.

8. Lower respiratory tract infections.

Pertussis. Acute bronchitis. Flu. Pneumonia. Pulmonary tuberculosis.

9. Gastrointestinal tract infections.

Gastroenteristis caused by Salmonella, Shigella, Campylobacter, Yersinia, Vibrio, Aeromonas and Escherichia coli. Helicobacter pylori infections. Viral infections. Foodborne intoxication.

10. Urinary Tract Infections.

Cystitis, pyelonephritis and prostatitis.

11. Sexually Transmitted Diseases.

Gonococcal infections. Gonococcal urethritis. Genital herpes. Syphilis. AIDS. Other sexually transmitted diseases.

12. Other infections.

Other infections.

Other infections.

Other infections.

Other infections

Conjunctivitis. Keratitis. Endolftalmitis. Infections of the skin and soft tissue. Congenital and perinatal transmission.

13. Fungal Infections.

Superficial mycoses, cutaneous, subcutaneous, systemic, and opportunistic.

14. Importance of parasitological analysis in human health.

Clinical and laboratory diagnosis in Parasitology - The problem of laboratory diagnosis in human parasitology - False positives and false negatives - Types of parasitological analysis - The interpretation of analytical results: its relevance.

15. Parasitological coprology I.

Diet and warnings to the patient - Faecal sample collection, sample size and precautions .- Treatment: factors to consider - Preservation: types of preservative liquids, advantages and disadvantages

16. Parasitological coprology II.

Macroscopic and microscopic examinations.- Analytical techniques: direct examination types - Study of faecal digestion - Occult blood smear - Faecal smear: its relevance - Faecal smear stains: types and basics.

17. Parasitological coprology III.

Concentration techniques: principles and types - Concentration by flotation: Willis and Faust techniques- Concentration by sedimentation - Dyphasic analytical techniques: M.I.F. and Formalin-ethyl ether.

18. Parasitological coprology IV.

Concentration techniques: principles and types - Concentration by flotation: Willis and Faust techniques- Concentration by sedimentation - Dyphasic analytical techniques: M.I.F. and Formalin-ethyl ether.

19. Helminthology - study of adult specimens.
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General techniques for morphological and anatomical study of the entire adult and / or fragments of helminth parasites - Digenetic trematodes, Cestodes, Nematodes and Acanthocephales: fixation, preservation, staining, preparation and mounting.

20. Parasitological haematology and genitourinary analyses

Direct examination.- Thin smear.- Thick smear.- Staining.- Concentration techniques.- Genito-urinary analyses.- Direct techniques.- Study of urinary sediment.- Concentration techniques.- Staining.- Cultures.

21. Other biological materials and arthropods.

Analyses of tissues, aspirates and other body fluids.- Cultures and animal inoculation.- Study techniques of arthropods prone to analysis of social impact.

22. Immunological and molecular parasite diagnoses..

Non-specific diagnosis: eosinophilia.- Specific diagnosis: applications of the immune response to the diagnosis of parasitic diseases.- Brief notions on the main reactions of immunological diagnosis in Parasitology.- Advantages and limitations of parasite immunodiagnosis.- Brief notions on molecular parasite diagnosis.

23. LABORATORY PROGRAM

- Coproparasitological analysis.- Study of digestion and its impact on parasitological analysis.
- Wet mount and with colourings.- Fecal smears: preparation and staining.
- Undertaking the most common concentration techniques by flotation and centrifugation.
- Preparing and visualisation of the Graham tape and Kato-Katz smear.
- Preparation of permanent helminth slides.
- Urine analysis.- Urinary sediment study.
- Observation of permanent slides of human parasite species.- Case studies: observation of actual case preparations.
- Observation of permanent slides of arthropod species of medical interest.

WORKLOAD

ACTIVITY	Hours	% To be attended
Theory classes	28,00	100
Laboratory practices	25,00	100
Tutorials	3,00	100
Seminars	2,00	100
Development of group work	8,00	0
Preparing lectures	52,00	0
Preparation of practical classes and problem	30,00	0
TOTAL	**148,00**	

TEACHING METHODOLOGY

• ***Theoretical classes.*** In these classes the lecturer will give an overview of the topic under study with special emphasis on new aspects or special complexity and use new teaching tools. During these mandatory classes, the lecturer will explain the problems related to the diagnosis of diseases caused by microorganisms or parasites, as well as the basic methodology to be followed for proper collection and processing of each and every one of the biological samples that can be processed in a laboratory for the diagnosis of these diseases. Meanwhile, students should take note of the information they receive, at the same time they should try to raise any doubts and questions that arise at the time.

• ***Practical classes.*** Practical classes in the lab focus on two parts: the lecturer will present the objectives, report on material handling, will supervise the job to be done and help with the interpretation of results; by contrast, students will conduct the technical procedure independently.

• ***Tutorials.*** In these classes, the student may express his/her doubts and needs, while the teacher should guide him/her and solve his doubts in order to achieve a suitable technical knowledge of the subject matter. If students do not express any doubts, the teacher will ask questions related to analysis and thus assess each student's level. Students attend tutorials in small groups..

• ***Seminars.*** Students for voluntary groups of a maximum of four, having to elaborate and deliver an oral presentation, including a written text for the teacher, on a topic proposed by the teacher. The aim of these seminars is for the students to look up information, train the ability to summarize and to express themselves. The ability to work in a team is another objective of these seminars. In both subjects, one seminar each will take place.

OBSERVATION: The agenda contemplated in the academic year 2020-2021 (with health situation maintained by Covid-19) will only be activated if the health situation requires it and with prior agreement of the Governing Council

EVALUATION

To evaluate the learning taking place, it is considered essential to direct observation of the level acquired by the student, which may be made at all hours of attendance, especially and primarily in regard to the observation of daily work performed. This should allow the professor directly establish a dynamic picture of the progress of each student through each part of matter.

However, the numerical grade of knowledge and skills acquired must be established based on methods that allow objective and comparable measure of the same, with record results, which means qualifying written tests.

The evaluation of each part of the course will be done through a final review of the theoretical.

The maximum score can get final is 10 points, corresponding to 60% (6 points) to the microbiological and the remaining 40% (4 points) to the parasite, to break down in:

A) MICROBIOLOGY

1. Evaluation of theoretical content that will be up to 90% of the final grade, and assessed by means of a final exam. In special cases, oral examinations can be made.

2. Evaluation of practical content will be 10% of the final grade, with required implementation. In addition, a specific examination for the evaluation of this section.

3. This activity is **MANDATORY AND NON-RECOVERABLE**, in accordance with the provisions of article 6.5 of the UV Evaluation and Qualification Regulations for Bachelor's and Master's degrees. In the event that, for **justified reasons**, it is not possible to attend, it must be communicated **sufficiently in advance**, so that the person in charge of the subject can assign the student a session in another group. Students will not be able to pass the course without doing and passing the laboratory practicals

4. **The final calification will be global, and to pass the course you must obtain at least 50% of the points in the "evaluation of theoretical content" and in the "evaluation of practical content". In addition, the exam must be balanced and not present serious deficiencies in important concepts or parts of the subject.**

5. Those students who do not take the theoretical exam will be considered not presented for official purposes. Finally, if the student does not pass the theoretical part, the practical grade (passed) **will only be maintained during the following two academic years whether the student enrolls in the subject or not.** After this time, the student **must repeat them again, requesting inclusion in a group of practices.**

B) PARASITOLOGY

1. 90% of the final mark will be obtained by taking a written exam evaluating the contents of the theoretical classes. In exceptional cases, an oral exam can be taken.
2. 5% of the final mark originates from the evaluation of the practical contents, i.e. obligatory attendance (70%) as well as an evaluation of the attitude in the practical classes (30%). Moreover, the presentation of the notebook containing the tasks undertaken (60%) may be demanded or even a specific exam on the tasks carried out (40%).
3. 5% of the final mark originates from the evaluation of tutorials, considering the attitude and dedication of the student.
4. Students who attend a seminar will have up to 5% added to their final mark, taking into account their dedication and tasks carried out.
5. The final mark in Parasitology is a general one, of which at least 50% of the points originate from the evaluation of the theoretical contents. Other marks will then be added accordingly.
6. Those students who are not present in the first call for the theoretical exam are officially considered absent and will have to be present for the second call. Thus, practice and tutorials (and seminars)

will be considered in the second call. Finally, students who do not pass the subject in the academic year will have their assessments kept for the next academic year.students who do not pass the subject in the academic year will have their assessments kept for the next academic year.

7. Both parts of the subject Microbiological and Parasitological Analyses will have to be passed by the student. Should this not be the case, the mark of the passed subject will be kept for the second call.

Evidence of copying or plagiarism in any of the assessable tasks will result in failure to pass the subject and in appropriate disciplinary action being taken. Please note that, in accordance with article 13. d) of the Statute of the University Student (RD 1791/2010, of 30 December), it is the duty of students to refrain from using or participating in dishonest means in assessment tests, assignments or university official documents.

In the event of fraudulent practices, the "**Action Protocol for fraudulent practices at the University of Valencia**" will be applied (ACGUV 123/2020):

https://www.uv.es/sgeneral/Protocols/C83sp.pdf

REFERENCES

Basic

- Microbiología Clínica y Sanitaria. Rotger, R. Ed. Síntesis, 1997.
- Microbiología Clínica y Enfermedades Infecciosas, 2ª ed. Spicer, W.J. Ed. Elsevier, 2009.
- Tratado de Enfermedades Infecciosas y Microbiología Clínica. Ausina, V. y Moreno, S. Ed. Panamericana, 2006.
- - MICROBIOLOGÍA MÉDICA. 7ª Ed. Murray, P.R.,Pfaller, M.A. y Rosenthal, K.S. Editorial Elsevier, 2013
- http://www.seimc.org/inicio/index.asp (Sociedad Española de Enfermedades Infecciosas y Microbiología Clínica)
- Diagnóstico Microbiológico. 12ª ed. Bailey & Scott. Ed. Panamericana, 2009
- Microbiología en Ciencias de la Salud. Conceptos y Aplicaciones. 3ª ed De la Rosa, M., Prieto, J., Navarro Marí, J. Mª. Ed. Elsevier, 2011.
- Microbiología e Inmunología Médica. 3ª ed. Levinson, W. Ed. Mcgraw-Hill / Interamericana de España, 2006.
- ASH (L.R.) & ORIHEL (T.C.), 1991.- Parasites: a guide to laboratory procedures and identification. ASCP Press (American Society of Clinical Pathologists), Chicago
- ASH (L.R.) & ORIHEL (T.C.), 2010.- Atlas de Parasitología Humana. 5 Edición. Editorial Médica Panamericana.

- BAILENGER (J.), 1982.- Coprologie parasitaire et fonctionelle. 4eme Edition. Editorial 52 Rue d'Arcachon, Pechade Imp., Burdeos.
- GARCIA (L.S.), 2001.- Diagnostic Medical Parasitology. American Society for Microbiology
- GOLVAN (Y.J.) & AMBROISE-THOMAS (P.), 1984.- Les nouvelles téchniques en Parasitologie. Flammarion Médicine-Sciences, Paris.
- MAIZELS (R.M.), BLAXTER (M.L.), ROBERTSON (B.D.) & SELKIRK (M.E.), 1991.- Parasite antigens, Parasite Genes. A laboratory manual for molecular Parasitology. Cambridge University Press, Cambridge.
- ORIHEL (T.C.) & ASH (L.R.), 1995.- Parasites in Human Tissues. ASCP Press (American Society of Clinical Pathologists), Chicago
- OMS,1992.- Métodos básicos de laboratorio en Parasitología Médica. Organización Mundial de la Salud, Ginebra.

Additional

- Biología de los microorganismos (Brock). M.T. Madigan, J.M. Martinko, P.V. -Dunlap y D. P. Clark. (2015) 14ª edición. Pearson Education S.A., Madrid (Pearson/Addison Wesley). ISBN: 9788490352793
- Microbiología. L.M. Prescott, J.P. Harley y A.K. Donald. (2016) 7ª edición. McGraw-Hill/Interamericana. ISBN: 9788448191207
- ROGAN (M.T.), edit., 1997.- Analytical Parasitology. Springer Lab Manula. Springer-Verlag, Germany