

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

<b>Code</b>	40351
<b>Name</b>	Epidemiology and Diagnosis of Parasitic Illnesses
<b>Cycle</b>	Master's degree
<b>ECTS Credits</b>	13.0
<b>Academic year</b>	2023 - 2024

**Study (s)**

<b>Degree</b>	<b>Center</b>	<b>Acad. year</b>	<b>Period</b>
2038 - M.U. en Enfermedades Parasitarias Tropicales 09-V.1	Faculty of Pharmacy and Food Sciences	1	Annual
3145 - Human and Animal Parasitology	Doctoral School	0	First term

**Subject-matter**

<b>Degree</b>	<b>Subject-matter</b>	<b>Character</b>
2038 - M.U. en Enfermedades Parasitarias Tropicales 09-V.1	3 - Epidemiology and diagnosis of parasitic diseases	Obligatory
3145 - Human and Animal Parasitology	1 - Complementos de Formación	Optional

**Coordination**

<b>Name</b>	<b>Department</b>
ESTEBAN SANCHIS, JOSE GUILLERMO	358 - Pharmacy, Pharmaceutical Technology and Parasitology

**SUMMARY**

The subject includes an up-to-date overview on the **epidemiology** (including parasite epidemiology and epidemiological geography) of parasitic diseases and their **diagnoses** from an aetiological point of view (with special emphasis on **coprology**) and also from an indirect viewpoint referring to the **immunology and immunodiagnosis of parasitic diseases**, as well as **molecular parasitology**.

The contents of this module refer to:



- epidemiological aspects of parasites which continue to be an essential part of the work of all professionals in the health sector, and it is crucial to correctly analyse the importance of the geographic distribution of parasites and their hosts, the influence of abiotic and biotic environmental factors on the epidemiology of parasitic diseases and the application of remote detection (teledetection) in public health, in general, and in parasitology in particular;
- aetiological diagnosis of parasitic diseases, which concern basic laboratory techniques in human parasitology and microscopic visualization of any form or structure in which certain parasite species may appear in the distinct biological samples to be analysed. Within this field of diagnosis, parasite coprology constitutes one of the most relevant parts within this module and Master, due to the large number of parasite species encountered in the gastrointestinal tract and related glands, as well as the small size of most parasite structures that can only be detected by means of coproparasitological analyses;
- immunology and immunodiagnosis of parasitic diseases which is to analyse the immune response in the context of parasite-host interaction, the immunopathology associated to parasitoses, the application of immunoparasitological methods in the laboratory and the characterization and interpretation of immunodiagnostic methods in Parasitology;
- molecular parasitology, which is to shed light on parasite molecules, thus explaining the complex parasite-host relationship in order to establish control mechanisms through the design of systems of molecular diagnosis, design of vaccinations and highly specific treatments.
- finally, integrate the knowledge acquired with the **SDGs** into models of **sustainable development** with a health focus.

## PREVIOUS KNOWLEDGE

### Relationship to other subjects of the same degree

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

### Other requirements

The contents of this module can be studied without the necessity of studying the remaining modules of this Master, although it would be convenient and recommendable to have some previous and basic knowledge of Parasitology and parasitic diseases.

## OUTCOMES

### 2038 - M.U. en Enfermedades Parasitarias Tropicales 09-V.1

- Students should apply acquired knowledge to solve problems in unfamiliar contexts within their field of study, including multidisciplinary scenarios.
- Students should be able to integrate knowledge and address the complexity of making informed judgments based on incomplete or limited information, including reflections on the social and ethical responsibilities associated with the application of their knowledge and judgments.



- Ser capaces de obtener y de seleccionar la información y las fuentes relevantes para la resolución de problemas, elaboración de estrategias y asesoramiento a clientes.
- Contemplar en conjunto y tener en cuenta los distintos aspectos y las implicaciones en los distintos aspectos de las decisiones y opciones adoptadas, sabiendo elegir o aconsejar las más convenientes dentro de la ética, la legalidad y los valores de la convivencia social.
- Know how to work in multidisciplinary teams reproducing real contexts and contributing and coordinating their own knowledge with that of other branches and participants.
- Proyectar sobre problemas concretos sus conocimientos y saber resumir y extraer los argumentos y las conclusiones más relevantes para su resolución.
- Ser capaz de asumir cualquiera de las tareas y responsabilidades relacionadas con las enfermedades parasitarias humanas: preparación práctica y formación teórica actualizadas de sanitarios para desempeñar trabajos, funciones y cargos de todo tipo y nivel en el amplio campo de la lucha, control, diagnóstico, difusión, enseñanza y estudio de las enfermedades parasitarias en todo el mundo.
- Conocer las enfermedades parasitarias en todos sus aspectos de etiología (caracterización morfoanatómica y molecular, ciclo biológico), epidemiología, clínica (síntomatología y patología), diagnóstico (etiológico, inmunológico y molecular), profilaxis y control.
- Conocer la terapéutica antiparasitaria.

## LEARNING OUTCOMES

In “**Epidemiology of parasitic diseases**” measures of frequency, as well as methods, design and epidemiological bias will be acquired.

In “**Epidemiological geography of parasitic diseases**” the geographical distribution of these diseases, the influence of environmental, biotic and abiotic factors on the biological cycle of parasites, and consequently on the transmission of parasitic diseases will be analysed. Furthermore, training on how to carry out the design of Geographical Information Systems, interpreting and elaborating them for the most important parasitic diseases, basically schistosomiasis, fascioliasis, malaria and other vector-borne diseases, will be provided.

In “**Aetiological diagnosis of parasitic diseases**”, and more particularly in the field of “**Parasite Coprology**”, the analytical terminology, as well as skills being part of the adequate management of all material used in the field of aetiological diagnosis will be mastered. The fundamentals of the methods and techniques used in this type of diagnosis and their application will be understood. The necessary techniques for adequate parasitological processing of any biological sample liable to analysis at a parasitological laboratory, as well as the ability to detect errors made in proceedings along analytical processes at laboratories, and to discern the repercussions that these may consequently have on the results obtained, will be acquired. The diagnostic utility of each method and technique, as well as, the knowledge on the biological material needed for a correct diagnosis of each of the different human parasitoses will be acquired. Aetiological diagnosis of any parasitological structure liable to detection in any biological sample will be carried out. Finally, the criteria for management of bibliographical materials of any type in



the field of aetiological diagnoses of parasitic diseases will be established.

In “**Immunology and immunological diagnosis**” basic knowledge on the fundamentals of immunology, as well as its application in concrete parasitological cases, knowledge on the immune system as well as on the molecular bases of the immune response will be acquired. Moreover, knowledge on the basis of the host-parasite interaction and the immunological mechanisms present in the development of parasitoses will be acquired. Also, knowledge on the application of immune-parasitological methods at the laboratory, as well as the basics and the application of experimental aspects together with their interpretation will be acquired.

In “**Molecular Parasitology**” knowledge on the various forms of the preparation of parasitological material to be analysed by means of genomic and proteomic techniques, as well as the use of related bibliographical material will be acquired. Also, the ability to design experiments, to observe and interpret results, as well as to understand and discuss the advantages and limitations of experimental approaches, will be acquired. The use of the Internet as a source of information on nucleotide and protein sequences, as well as the management of software related to the analysis of sequences will be trained. At the same time, research topics on molecular parasitology, analysing and synthesising results of specialists, and giving an oral, written and visual presentation will be taught.

In “**Sustainability**” Knowledge about the SDGs and apply sustainable development models with a health focus; Adopt ways of thinking and acting with a responsible and sustainable profile; Being able to design and develop health projects under the principles of sustainability and social responsibility: I work collaboratively; Be able to design and execute projects under public-private partnership models; Application in the field of the theoretical knowledge on parasitic diseases acquired; Visualize the parasitological situation in the real world; Legal aspects and different bureaucratic procedures to plan, prepare and streamline health projects in different countries of the world.

All of the above-mentioned is to lead to the acquisition of a better understanding of the nature of biological associations and to the ability to critically analyse data of biological and/or experimental character. Another goal is the acquisition of social skills related to teamwork, presentation of topics, oral expression, social awareness of parasitic diseases and professional training. Finally, it is considered fundamental to acquire the ability to argue in a sound manner and critical reasoning and, thus, being able to find analytical solutions together with other professionals. In this sense, it is essential to develop professional awareness with regard to the relevance of the diagnosis and to make use of new technologies.

## DESCRIPTION OF CONTENTS

### 1. Epidemiology of parasitic diseases

Study of individual cases: phases, forms and transmission of diseases.

Study of parasitoses as mass illnesses.

Importance of secular trends of parasitic diseases.





## **2. Epidemiological geography of parasitic diseases**

Epidemiological geography of each parasitic disease.  
Geographic Information Systems (GIS) in Parasitology.  
Climatic prediction indices for parasitic diseases.  
Remote (satellite) detection of parasitic diseases.

## **3. Aetiological diagnosis of parasitic diseases**

Significance of parasitological analysis and problems concerning direct diagnosis of parasitic diseases  
Sampling, transporting and processing of biological samples to be analysed at laboratories through the most appropriate techniques  
Methods and techniques of diagnosis including training in microscopic measuring techniques of parasitic structures.

## **4. Parasite coprology**

Importance and problems of coproparasitological diagnosis.  
Practical application of all methods and techniques required, from an aetiological point of view, in coproparasitological analysis.  
Microscopic recognition of any parasite structure liable to detection in faeces, based on each of the analytical techniques used.  
Diagnosis of various clinical cases based on human faecal samples.

## **5. Immunology and immune diagnosis**

Basic principles of the immune response in vertebrates: the case of parasitic infections.  
Antigen recognition and response activation of the immune response effector mechanisms of the immune response and regulation of the immune response.  
Immune response to parasites. Characterization of the immunological mechanisms involved in host parasite interaction in protozoa, helminths and arthropods.  
Regulation of the immune response against parasites.  
Immuno-evasion mechanism of parasites and their effects on the interaction with the host.  
Immuno-pathological phenomena associated with parasitic infections.  
Experimental methods in immunoparasitology.  
Application of the immune response to the diagnosis of parasitic infections.  
Development and interpretation of immune diagnosis in parasitic diseases.  
Basic principles of the development of vaccines against parasites

**6. Parasitología Molecular**  
**Molecular Parasitology**

General concepts of molecular methods in Parasitology.  
Molecular epidemiology of tropical parasitic diseases.  
Preparing and obtaining samples for their study.  
Description of genomics and proteomics methodology.  
Molecular mechanisms for the evasion of the immune response used by parasites.  
Bioinformatics in Molecular Parasitology.  
Applications of Molecular Parasitology.  
Displayed of the techniques used in the laboratory.

**7. Sustainability**

Social Responsibility and Cooperation in the field: Objectives and goals of the 2030 Agenda: Weaknesses and improvements of the SDGs;

Shared and subsidiary social responsibility; Multi-stakeholder collaboration formulas;

Planning and examples of responsible and sustainable health projects; Cooperation and health projects in Africa: the case of Mozambique; Cooperation and health projects in Latin America: the case of Argentina (Mundo Sano); Health projects in conflict situations: MSF's action.

**WORKLOAD**

ACTIVITY	Hours	% To be attended
Theory classes	130,00	100
Development of group work	10,00	0
Development of individual work	10,00	0
Study and independent work	50,00	0
Readings supplementary material	35,00	0
Preparation of evaluation activities	40,00	0
Preparing lectures	20,00	0
Preparation of practical classes and problem	20,00	0
Resolution of case studies	10,00	0
<b>TOTAL</b>	<b>325,00</b>	



## TEACHING METHODOLOGY

- **Master class** in theory allowing the teacher to organise and plan the subject, study and expand on important aspects of each lesson. Each master class is accompanied by suitable graphic material backing up the consolidation of knowledge.
- **Tutorial class** or get-together between the tutor and group of students aiming at an exchange of information, analysing and providing orientation or assessment of a problem or project and debating a useful topic for the academic and personal development of the student.
- Participative model in **practical classes**, guiding the student's work in the laboratory so that he/she is able to apply his/her knowledge acquired in the theoretical classes, so that correct microscopy of study parasites is achieved together with the solution of practical problems or cases and correct decision making.

## EVALUATION

A student passes the module with a minimum of **5 points out of 10**.

The mark of the module will be the sum of a:

- a) **written text (theoretical-practical exam)**, test and short questions on: Epidemiology (10%), Aethiological Diagnosis (10%), Immunology and Immunodiagnosis of Parasitic Diseases (10%) as well as Molecular Parasitology (10%);
- b) **practical exam** on Coprology of Parasitic Diseases (40%)
- c) **practical work** on Epidemiological Geography of Parasitic Diseases (10%)
- d) **continuous evaluation** (partial questionnaires, partial tasks, participation, motivation, assistance, etc.) (5%).

It is mandatory to pass the practical exam of Coprology (5 points out of 10) to successfully pass the module.

The copy or manifest plagiarism of any task that is part of the evaluation will imply the impossibility of passing the subject, then submitting to the appropriate disciplinary procedures.

Please note that, in accordance with Article 13. d) of the University Student Statute (RD 1791/2010, of December 30), it is the duty of a student to refrain from using or cooperating in fraudulent procedures in the evaluation tests, in the works carried out or in official documents of the university.



## REFERENCES

### Basic

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- BEAVER (P.C.), JUNG (R.C.) & CUP (E.W.), 2003.- Parasitología Clínica de Craig Faust (3era ed.). Masson Editores, S.A., Barcelona, 823 pp.
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