

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

<b>Code</b>	34080
<b>Name</b>	Parasitology
<b>Cycle</b>	Grade
<b>ECTS Credits</b>	6.0
<b>Academic year</b>	2020 - 2021

**Study (s)**

<b>Degree</b>	<b>Center</b>	<b>Acad. year</b>	<b>Period</b>
1201 - Degree in Pharmacy	Faculty of Pharmacy and Food Sciences	3	Second term
1211 - D.D. in Pharmacy-Human Nutrition and Dietetics	Faculty of Pharmacy and Food Sciences	3	Second term

**Subject-matter**

<b>Degree</b>	<b>Subject-matter</b>	<b>Character</b>
1201 - Degree in Pharmacy	14 - Parasitology	Obligatory
1211 - D.D. in Pharmacy-Human Nutrition and Dietetics	1 - Asignaturas obligatorias del PDG Farmacia-Nutrición Humana y Dietética	Obligatory

**Coordination**

<b>Name</b>	<b>Department</b>
BARGUES CASTELLO, M DOLORES	21 - Cellular Biology and Parasitology

**SUMMARY**

Parasitology is a core discipline that is taught in the second quarter of the third year of the Pharmacy Degree. This course covers the necessary basic training on the morphology and bionomics of the parasites and their host-parasite relationships in order to apply these concepts to the epidemiology, pathology, diagnosis, treatment, prevention and control of the major diseases they cause on humans. It comprises a detailed study of the biological cycles of the parasites, their modes of transmission, the ways of human infection, their geographical distribution and a basic study of symptoms and diagnosis of the diseases they cause. All these skills are listed in each issue together with the prevention and control of parasitic diseases and knowledge of the most appropriate drugs to treat them. Parasitology is analysed within the general context of science, with special emphasis on its current role in the study of the so-called neglected diseases, among which parasitic infections are particularly relevant. The course gives particular attention



to the impact of these parasites and their relationships to health education and public health as well as to global and climate changes.

## PREVIOUS KNOWLEDGE

### Relationship to other subjects of the same degree

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

### Other requirements

Previous complete courses of Human Anatomy and Physiology are recommended.

## OUTCOMES

### 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 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.
- Develop know-hows for their professional career.
- Understand and manage the basic scientific terminology related to the subject
- Know how to apply the scientific method and acquire skills for managing the main bibliographic sources.
- Knowledge of the morpho-anatomy and life cycle of the parasite agents that cause human diseases and pets.
- Relationship between the life cycle of the parasites with the epidemiology, geographical distribution and infestation and transmission of parasites to humans.
- Knowledge of the nature and behaviour of parasites such as infectious agents. Study of the diseases they cause, symptoms and diagnosis.
- Relationship between the life cycle of the parasites with the measures for the prevention and control of parasitic diseases.
- Rational knowledge of the most appropriate medications for the treatment of parasitic diseases.



## LEARNING OUTCOMES

- 1.- Strength in knowledge of the phenomenon of parasitism applied to the area of health.
- 2.- Qualification to identify the parasite species that cause human diseases.
- 3.- Knowledge of the biological cycles of parasites and parasite-host relationships.
- 4.- Knowledge of the major human parasitic diseases including epidemiology, pathology, diagnosis, treatment and prophylaxis.
- 5.- To acquire a general understanding of microscopy to facilitate analytical processes.

## DESCRIPTION OF CONTENTS

### 1. General Parasitology

Concept and definition of Parasitology, parasitism, parasitosis, parasite and host.- Gradations or types of parasitism. Parasite specificity.- Anthroponoses and zoonoses.- Carrier and reservoir.

Biological cycles of parasites: direct and indirect evolution.- Concepts of definitive host and intermediate host.- Types of intermediate hosts. Vectors: types.

Host-parasite relationships.- Pathogenicity of parasites on their hosts. Anti-parasitic immunity.- Applications of the immune response to prophylaxis and diagnosis of parasitic diseases.

Scientific taxonomy and nomenclature.- The species concept in parasitology.- Introduction to the special part of Parasitology: zoological groups with parasite representatives.

### 2. Protozoology

Subkingdom Protozoa: characterisation.- Study of their morphology and life cycle. Protozoan parasites of human importance and parasitic diseases that they produce: epidemiology, transmission, symptoms, pathogenesis, diagnosis, treatment and prophylaxis.

Entamoeba and amoebic dysentery; Free living opportunistic parasitic amoebas and meningoencephalitis; Giardia and Giardiasis; Trichomonas and Trichomoniasis; Cryptosporidium and Cryptosporidiasis; Toxoplasma and Toxoplasmosis; Plasmodium and Malaria; Trypanosoma and sleeping sickness and Chagas disease; Leishmania and Leishmaniasis; Balantidium and Balantidiasis; Pneumocystis and Pneumocystiasis. Phylum Myxozoa and Phylum Microspora and AIDS relationships. Blastocystis hominis.



### 3. Helmintology

Trematodology: Subkingdom Metazoa. Phylum Plathelminthes.- Superclass Trematoda: characterisation and division.- Class Digenea: study of morphology and life cycle. Human digenean parasites and parasitic diseases they produce: epidemiology, transmission, symptoms, pathogenesis, diagnosis, treatment and prophylaxis. Fasciola, Dicrocoelium, Opisthorchis, Clonorchis and hepatic distomatosis; Gastrointestinal distomatosis and causative fluke species; Paragonimus and lung distomatosis. Schistosoma and Schistosomiasis. Cercarial dermatitis caused by Schistosomatids.

Cestodology: Superclass Cercomeromorphae: characterisation and division.- Class Cestoda: morphology of larval and adult stages and biological cycle. Human cestode parasites and parasitic diseases they produce: epidemiology, transmission, symptoms, pathogenesis, diagnosis, treatment and prophylaxis. Diphylobothrium and Botriocephalosis; Esparganosis; Hymenolepis and Hymenolepiasis; Dipylidium and Dipylidiasis; Taenia and Taeniasis; Cysticercosis; Echinococcus and Hydatidosis and Alveococcosis.

Nematodology: Phylum Nematoda: general characterisation of their morphology and life cycle. -Human parasitic nematodes and parasitic diseases they produce: epidemiology, transmission, symptoms, pathogenesis, diagnosis, treatment and prophylaxis. Trichuris and Trichuriasis, Trichinella and Trichinosis; Capillaria and Capillariasis; Strongyloides and Strongyloidiasis; Ancylostoma / Necator and Ancylostomiasis; Ascaris and Ascariasis; Enterobius and Oxyuriasis; Onchocerca and Onchocercosis; Filariae and Filariasis, Dracunculosis or medina worm filariasis. Larva migrans.

### 4. Parasitic Arthropodology and Malacology

Phylum Arthropoda: general characterisation of their morphology and biology. Arthropod parasites, transmitters and vectors. Classification of the Arthropoda: Subphylum Chelicerata and Mandibulata. Class Arachnida: characterisation. Superclass Hexapoda, Class Insecta. Scabies and diseases transmitted by ticks. Pediculosis. Health importance of Triatominae bugs, lice and fleas. Diptera: vectorial role of Culicinae, Anophelinae, Phlebotominae, Simuliidae, Ceratopogonidae and Tabanidae. Myiasis: concept, types and causative species of Diptera.

Phylum Mollusca: general characterisation of their morphology and biology. Gastropods of health interest as intermediate hosts of human diseases. Lymnaeids and Planorbids transmitting trematode diseases.

### 5. Laboratory training

Use and calibration of binocular microscope for measuring and drawing of various parasitic forms at different magnifications.

Anatomical-morphological study of the main flukes (Trematodes: adult and larvae) that cause human diseases.

Anatomical-morphological study of the main Cestodes (adults and larvae) that cause human diseases.

Anatomical-morphological study of the major Nematodes (adults and larvae) that cause human diseases.

Characterisation of the major human parasitic helminths by means of their eggs expelled together with faeces, urine or sputum.





Specific characterisation of intestinal and other open-cavity protozoa that cause human diseases. Comparison with non-pathogenic human species.

Specific characterisation of blood and tissue protozoa that cause human diseases.

Anatomical-morphological study of mites and non-dipteran insects (ticks, Siphonaptera and Hemiptera) of relevant interest in public health and analysis of their role as vectors of infectious agents.

Anatomical-morphological study of Dipteran insects (Nematocera, Brachycera -Tabanidae and Cyclorhapha) of relevant interest in public health and analysis of their role as vectors of infectious agents.

Anatomical-morphological study of Gastropod Molluscs transmitting human parasitic diseases.

Characterisation of Lymnaeids and Planorbids.

## WORKLOAD

ACTIVITY	Hours	% To be attended
Theory classes	35,00	100
Laboratory practices	17,00	100
Tutorials	3,00	100
Seminars	2,50	100
Attendance at events and external activities	2,00	0
Development of group work	3,00	0
Development of individual work	2,50	0
Study and independent work	47,50	0
Readings supplementary material	5,00	0
Preparation of evaluation activities	2,00	0
Preparing lectures	19,00	0
Preparation of practical classes and problem	6,00	0
Resolution of case studies	2,00	0
Resolution of online questionnaires	1,00	0
<b>TOTAL</b>	<b>147,50</b>	

## TEACHING METHODOLOGY

1.- The teaching is based on the individual study of the contents listed above, which are developed in lectures and reinforcing the organisation of tutoring. Prior to the date of tutoring, the student must have prepared activities to reinforce the learning of specific aspects of the program. The seminars will enable students to develop competences of teamworks, oral communications and knowledge of English.

During the first teacher lecture, a reduced systematic annex will be given to students. This annex will save the sterile storage of the large systematic lists, although all students are required to know the specific names of the parasite species affecting humans, since that annex only provides information up to genus level.



2.- Practical sessions will be developed in the laboratory, where the teacher will initially expose the content of the activity, resolve doubts and direct the execution of each practice. The student will be provided with a notebook-practices guide.

3.- In the tutorials, the student will receive the proposed subject or the problems to solve, that he should prepare within a group activity and present/expose at a fixed day.

4.-Self-work to be developed by students will be coordinated by the teacher who will advise on the objectives, methodology, bibliography and other aspects of interest for each seminar. The work will be exposed orally to the rest of their classmates.

Methods and Times: Seminars 2; Theory 36, Practical 17; Tutorials 2.

## EVALUATION

A) Written examination for the evaluation of student's knowledge and understanding of the theoretical contents of the discipline contents (80%).

B) Evaluation of laboratory work by monitoring the work performed during the course and the ability to solve experimental problems; Making a written test to ensure knowledge and understanding of the practical content established for the area (15%).

C) Theoretical and practical evaluations should be independently overcome as an imperative to reach the minimum competence evaluation in the course.

D) The level of understanding of the contents of tutorials and seminars (5%) will be assessed. Attendance at seminars is mandatory.

Qualification criteria: Approved getting 5 out of the maximum of 10.

Contents of the theory test: All list of topics.

Type of exam: written, including questions for text answers and reasoning, tests, multiple answer questions, and so on.

Practical assessment:

Content: All list of topics.

Qualification criteria: We value the attendance (mandatory) and the students' knowledge will be assessed through examination of work practices (100% of the practices qualification). The exam will take place at the end of the practices and always before the theoretical exam. There will be a single exam for all practice groups. In the case of not approving the discipline in this course, the practice note (if approved whit 5 or higher), is saved for subsequent years.



To access the theoretical examination, practical assessment will be passed (according to qualification criteria mentioned above) and it is mandatory to pass the course.

## REFERENCES

### Basic

- ASH, L.R. & ORIHEL, T.C. (1997).- Atlas of Human Parasitology. 4<sup>o</sup> edition. American Society of Clinical Pathologist (ASCP) Press, Chicago.
- BEAVER, P.C., JUNG, R.C. & CUPP, E.W. (2003).- Parasitología Clínica de Craig Faust. Masson Editores, Barcelona.
- GALLEGO BERENGUER, J. (2003).- Manual de parasitología: morfología y biología de los parásitos de interés humano. Ediciones de la Universitat de Barcelona, Barcelona.
- MARKELL E.K., VOGEL, M. & JOHN, D.T. (1994).- Parasitología Médica. Edit. Interamericana, Madrid.
- KETTLE, D.S. (1995).- Medical and Veterinary Entomology. 2<sup>o</sup> edition. CABI Publishing.
- HIEPE, T., LUCIUS R., GOTTSEIN, B., 2011.- Parasitología General. Ediciones Acribia S.A. 1<sup>o</sup>ed. 620 pp.

### Additional

- SCHMIDT, G.D. & ROBERTS, L.S. (1989).- Fundamentos de Parasitología. 4<sup>o</sup> edition. Times Mirror/MOSBY College Publishing, St. Louis.
- BOGITSH, B.J. & CHENG, T.C. (1999).- Human Parasitology. 2<sup>o</sup> edition. Academic Press, Orlando.
- GARCIA, L.S. (2001).- Diagnostic Medical Parasitology. 4<sup>o</sup> edition. American Society for Microbiology.
- MARKELL, E.K., JOHN, D.T., & KROTOSKI, W.A. (1999).- Markell & Voge's Medical Parasitology. 8<sup>o</sup> edition. W.B. Saunders Company, Orlando.
- MARQUARDT, W.C., DEMAREE, R.S. & GRIEVE, R.B. (1999).- Parasitology and Vector Biology. 2<sup>o</sup> edition. Academic Press, Orlando.
- MEHLHORN (H.) & PIERASKI (G.), 1989.- Fundamentos de Parasitología. Parásitos del hombre y de los animales domésticos. Editorial Acribia, S.A., Zaragoza, 391 p.
- SOULSBY, E.J.L. (1987).- Parasitología y enfermedades parasitarias en los animales domésticos. 7<sup>o</sup> edición. Interamericana, México D.F.



SUN, T. (1999).- Parasitic Disorders: Pathology, Diagnosis and Management. 2<sup>o</sup> edition. Williams & Wilkins, Maryland.

BRUSCHI, F., 2014.- Helminth infections and their impact on global public health. Springer-Verlag, Wien. 502 pp.

Direcciones de interés:

[http://www.who.int/neglected\\_diseases/diseases/en/http://www.who.int/tdr/](http://www.who.int/neglected_diseases/diseases/en/http://www.who.int/tdr/)

<http://www.who.int/tdr/>

<http://www.dpd.cdc.gov/dpdx/>

<http://pathmicro.med.sc.edu/book/parasit-sta.htm>

<http://www.diplectanum.dsl.pipex.com/purls/>

## **ADDENDUM COVID-19**

**This addendum will only be activated if the health situation requires so and with the prior agreement of the Governing Council**

### **1. Contents**

All the contents initially programmed in the teaching guide are maintained.

### **2. Volume of work and temporary planning of teaching**

Maintenance of the teaching planning in both days and hours, since all the theoretical and practical content planned will be taught, but the methodology of the activities changes with respect to the teaching guide, due to the current situation that makes it necessary to adopt a hybrid teaching model.

No modification of ECTS.

No change in workload.

### **3. Teaching methodology**





- Theoretical teaching: They will be face-to-face class and according to the course calendar, but with the appropriate modifications to comply with the security regulations against COVID-19. In the case that the classroom capacity does not allow the presence of the entire group of students, the students will be distributed by groups, so that 50% will be in the Faculty classroom while the other 50% will connect online (from home), alternating their attendance for weeks. The class will always be held following the schedule (date and time) approved by the Center Board.
- Tutorials and Seminars: They will be in-class / online according to the dates set by the course calendar and the evolution of the pandemic.
- Practical classes: They will be in-class and in accordance with the course calendar, but with the appropriate modifications to comply with the security regulations against COVID-19, with limitation of the capacity of the laboratories to 50% establishing attendance shifts in each group. Audiovisual material will be used to cover the non-face-to-face teaching of the sessions and any other material will be provided to the students that allows them to complement what was seen in the laboratory sessions.

If there were a worsening of the situation or a state of total confinement, all face-to-face teaching would be carried out online with synchronous teaching.

The following teaching tools will be used to replace in person classes:

Theory: Power Point or pdf with voice over (Virtual Classroom) and Videoconference (Blackboard)

Practices: Power Point or pdf with voice over (Virtual Classroom) + Complete documentation with all the information in Virtual Classroom.

Tutorials: Exercises in the Virtual Classroom

Seminars: Videos and questionnaires in Virtual Classroom

#### **4. Evaluation**

If the evolution of the current pandemic allows it, it will be face-to-face and in the terms indicated in the teaching guide. Only in case this is not possible, the evaluation will be carried out online, using multiple choice questions in the virtual classroom which can be complemented with short and relational questions and visualization of images.

The relative weight of the theory, practices and seminars is maintained as indicated in the teaching guide:

Theory: 80%, Practices: 15%, Seminars: 5%



## **5.- Bibliography**

The recommended bibliography is maintained and has even been expanded with teachers' own materials on each topic to complement in person/online teaching.