

MODULE	SUBJECT	COURSE	SEMESTER	CREDITS	TYPE
Biology	Parasites and immunity	3º	2º	6	Optional
PROFESSOR (S)			TUTORING CONTACT INFORMATION		
<ul style="list-style-type: none"> Margarita Campos-Bueno 			Departamento de Parasitología, 4 th floor, Facultad de Farmacia. Universidad de Granada. Telephone:+34-958243861 E-mail: mcampos@ugr.es		
			TUTORING HOURS		
			Margarita Campos Bueno: Wednesday and Friday, from 10.00 to 13.00 hours.		
DEGREE IN WHICH THE SUBJECT IS TAUGHT			DEGREE IN WHICH THE SUBJECT COULD BE TAUGHT		
Pharmacy			Biology, Medicine		
PREREQUISITES AND RECOMENDATIONS					
To have studied the subjects: Parasitology, Immunology, Biochemistry, Cell physiology. Knowledge of the English language. Computer user level.					
BRIEF ACCOUNT OF THE SUBJECT PROGRAMME					
Parasitic antigens and immune response of the host. Mechanisms of evasion of the immune response. Immunomodulation of parasitic agents. Immunopathology of parasitic diseases. Parasites and immunodepression. Immunoprophylaxis against protozoans, helminths and parasitic arthropods.					
GENERAL AND SPECIFIC COMPETENCES					
<p>CG1. Identify, design, obtain, analyze, control and produce drugs and medicines, as well as other products and raw materials of health interest for human or veterinary use.</p> <p>CG3. Know how to apply the scientific method and acquire skills in the management of legislation, sources of information, bibliography, elaboration of protocols and other aspects that are considered necessary for the design and critical evaluation of preclinical and clinical trials.</p> <p>CG7. Identify, evaluate and assess problems related to drugs and medicines, as well as participate in pharmacovigilance activities.</p> <p>CG9. To intervene in the activities of health promotion, prevention of illness, at the individual, family</p>					



and community level; With an integral and multiprofessional vision of the health-disease process.
 CG13. Develop communication and information skills, both oral and written, to deal with patients and users of the center where he/she performs his/her professional activity. To promote the capacity of work and collaboration in multidisciplinary teams and those related to other health professionals.
 CG15. Recognize one's limitations and the need to maintain and update professional competence, paying particular attention to the self-learning of new knowledge based on available scientific evidence.

CE20. Understand the relationship between the life cycle of infectious agents and the properties of the active ingredients.
 CE21. Develop skills to identify therapeutic targets and the biotechnological production of drugs, as well as the use of gene therapy.
 CE23. To know the properties of cell membranes and the distribution of drugs.
 CE24. To know the nature and behavior of infectious agents.

OBJECTIVES (EXPRESSED IN TERMS OF EXPECTED RESULTS OF THE TEACHING PROGRAMME)

- To know how parasites are presented to the host and the impact of parasite antigens on fundamental aspects of diagnosis, therapeutics and prophylaxis.
- Know how the host responds to the presence of the parasite.
- Understand how parasites prevent the immune response of the host and its impact on the pathology of parasitic diseases.
- To study some interactions of the parasites with the immune system of the host and its consequences.
- To know basic aspects of the immunoprophylaxis of parasitic diseases.
- Understand the importance of some parasitic diseases in immunocompromised individuals.
- To know and understand the pathological manifestations caused by some species in man.

DETAILED SYLLABUS OF THE SUBJECT

THEORETICAL SYLLABUS

Knowing how parasites are presented to the host

- UNIT 1. Parasitic antigens. Study of its key features. Immunodiagnostic effect on treatment and immunoprophylaxis of parasitic diseases (1,5h).

Knowing how the host reacts to the existence of the parasite

- UNIT 2. Host immune response to parasitic invasion: peculiarities of the cellular immune response. Pressure consequences of the immune response in leishmaniasis (1,5h).
- UNIT 3. Host immune response to parasitic invasion: peculiarities of the humoral immune response. Vertebrate immunity against helminths. The intestine as a parasitic habitat (2 h).

Understanding how parasites evade the immune response of the host

- UNIT 4. Evasion of host immune response: key mechanisms. Evasion mechanisms of the innate response and its significance in parasitic protozoa (1h).



- UNIT 5. Mechanisms evasion of phagocytosis in parasitic protozoa. I. *Trypanosoma cruzi* and their escape to the cytosol (1,5h).
- UNIT 6. Mechanisms evasion of phagocytosis in parasitic protozoa. II. Study of the profound adaptation of *Leishmania spp.* to intracellular life (1,5h).
- UNIT 7. Evasion mechanisms of phagocytosis in parasitic protozoa. III. *Toxoplasma gondii* and the transformation of its intracellular compartment (1,5h).
- UNIT 8. Antigenic variation in the *Trypanosoma brucei* complex. Effect on host immune response and the pathology of the sleeping sickness (2h).
- UNIT 9. Antigenic variation and adhesive properties of *Plasmodium falciparum*. Impact on the pathology of malaria. Malaria and pregnancy (2,5h).
- UNIT 10. Molecular mimicry: definition and classification. Consequences for the host and the parasite. Exceptional study of the thrombospondin family in *Plasmodium falciparum* and its significance in the biology of the parasite. Chagas disease and autoimmunity (2,5h).

Studying the interactions of parasites with the host immune system and its association with its course.

- UNIT 11. Immunomodulation: definition and main mechanisms. Helminths as modulators of the immune system of the host: therapeutic applications (2h).
- UNIT 12. Immunity concomitant parasitic infections. Consequences for parasite and host. Special study in congenital toxoplasmosis (1h).
- UNIT 13. Immunopathology of parasitic diseases. Study of relevant examples in protozoa and helminths. Anisakiosis as a health problem with exceptional mention of the problem in Spain (2,5h).

Knowing basic aspects of immunoprophylaxis of parasitic diseases

- UNIT 14. Immunoprophylaxis in Parasitology. I. General considerations. Key problems in obtaining parasite vaccines for humans. Types of vaccines: advantages and disadvantages (1h).
- UNIT 15. Immunoprophylaxis in Parasitology. II. Special study of malaria vaccines. Existing status of major trials against parasitic diseases. Veterinary vaccines and its biological and economic impact (2h).

Understanding the significance of some parasitic diseases in immunocompromised individuals

- UNIT 16. Protozooses and immunosuppression. I. Emerging opportunists and parasites. Importance in VIH infected individuals (+). Study of the epidemiological and pathological alterations experienced in significant tissue protozosis in immunocompromised individuals. Study of human babesiosis (2h+1h seminar).
- UNIT 17. Protozooses and immunosuppression. II. Intestinal coccidiosis. Special study of cryptosporidiosis in immunocompromised and its problems. (2,5h).
- UNIT 18. Helminthiasis and immunosuppression. Strongyloidiasis and its current importance in endemic and



non-endemic areas. Situation in Spain (2,5h).

Knowing and understanding the pathological manifestations that cause the presence and the establishment of some species in man

- UNIT 19. *Sarcoptes scabiei* and scabies. Importance as a marker for immune deficiency syndromes. Demodex study of gender and demodectic mange. Dermatitis caused by ticks, Study of their role as vectors of infectious agents (1h+2h seminar).
- UNIT 20. Dust mites producers of respiratory allergies and contact dermatitis. Major allergens. Prophylaxis and control mechanisms (1h, seminar).

PRACTICAL SYLLABUS:

Seminars / Workshops

- Exercises and its resolution on programee items.
- Allergies caused by dust mites.
- *Sarcoptes scabiei* and scabies. The importance in immunodeficiency syndromes.
- Study of human babesiosis
- Dermatitis caused by ticks. Study of their role as vectors of infectious agents

Laboratory practices:

- Practice 1. Obtaining parasite antigens: somatic and excretory-secretory.
- Practice 2. Study and identification of species causing allergies and contact dermatitis.
- Practice 3. Study and identification of common parasites in immunocompromised individuals.
- Practice 4. Detection of antigens and antibodies in the parasitosis. Application of direct and indirect techniques.

BIBLIOGRAPHY

FUNDAMENTAL BIBLIOGRAPHY:

- Algarra López de Diego I., García Olivares E., Garrido Torres-Puchol F., Molina Pineda de Las Infantas I. 2001. Inmunología. Imprenta-Editorial Ave María. Granada.
- Immune Reponse to Parasitic Infections. Volume 1: Protozoa. 2015. Ed. Jirillo E. Co-editor Brandoniso O. Bentham Science Publisher Ltd.Sharjah, U.A.E.
- Immune Reponse to Parasitic Infections. Volume 2: Immunity to Helminths and Novel Therapeutic Approaches. 2015. Editors: Jirillo E., Magrone T., Miragliotta G. Bentham Science Publisher Ltd.Sharjah, U.A.E.
- Kennedy M.W., Harnett W. 2001. Parasitic nematodes: molecular biology, biochemistry and immunology. CABI, Oxon.
- Mansour T.E., Mansour J.M. 2005. Chemotherapeutic Targets in Parasites: Contemporary Strategies, Cambridge University Press.
- Marr J.J., Nilsen T.W., Komuniecki R.W. (eds). 2003. Molecular medical parasitology. Academic Press, Londres.
- Mehlhorn H. (ed.). 2001. Encyclopedic Reference of Parasitology. Springer-Verlag, Berlín.
- Regueiro González J.R., López Larrea C., González Rodríguez S., Martínez Naves E. 2011. Inmunología. Biología y patología del sistema inmunitario. 4ª edn revisada. Ed. Médica Panamericana S.A., Buenos Aires.
- Roberts L.S., Janovy J. jr. Foundations of Parasitology. 2004. 7ª edn., McGraw-Hill Publishers,



Dubuque.

- Roitt I.M., Delves P.J. 2003. Inmunología. Fundamentos. 10ª edn. Ed. Médica Panamericana S.A., Buenos Aires.
- Wakelin D. 1996. Immunity to parasites. How parasitic infections are controlled. 2ª edn. Cambridge University Press, Londres.
- Guía Práctica de Parasitología. Departamento de Parasitología. Universidad de Granada.
- Singer L.M., Igea J.M. 2005. Glosario trilingüe (EN-PT-ES) de términos, abreviaturas y siglas usados con frecuencia en inmunología. *Panace*. Vol. VI, nº 20.

The main periodical scientific publications, made available to the university community of Granada by the UGR, reviewed for the consultation and updating of the topics covered in the program are:

- Advances in Parasitology.
- Annual Review of Immunology.
- Annual Review of Microbiology.
- Clinical Microbiology Reviews.
- International Journal for Parasitology.
- Nature Reviews. Immunology.
- The Journal of Infectious Diseases.
- The Lancet.
- Trends in Parasitology.
- and others.

COMPLEMENTARY BIBLIOGRAPHY

- Students will be advised according to the autonomous work they have to develop.

RECOMENDED INTERNET LINKS

<http://www.ugr.es/~parasito/otros%20enlaces.html>

<http://www.who.int/es/index.html>

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

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

<http://www.diplectanum.talktalk.net/purls/>

TEACHING METHODOLOGY

	ACTIVIDAD FORMATIVA	COMPETENCIAS	
Presenciales	Clases de teoría	CG1,3,7,9,13,15 CE18,20,21,23,24	40 % (2,4 ECTS)
	Clases prácticas	CG1,9; CE20,21,23,24	
	Clases de problemas		
	Seminarios y/o exposición de trabajos	CG1,3,7,9,13,15 CE20,21,23,24	
	Realización de exámenes	CG3,13	



•		Prácticas de campo y viajes		
	No presenciales	Estudio de teoría y problemas	CG3,7,9,15 CE21,23,24	60 % (3,6 ECTS)
		Preparación y estudio de prácticas	CG3,7,9,15 CE20,21,23,24	
Preparación de trabajos		CG3,7,9,15 CE20,21,23,24		

EVALUATION (EVALUATION INSTRUMENTS, EVALUATION CRITERIA AND FINAL RATING PERCENTAGE, ETC.)

CONTINUOUS ASSESSMENT

The evaluation will be made taking into account the work of the student in the different activities programmed, not being able to surpass the subject without having demonstrated a sufficient level of knowledge in the written tests. The following criteria will be met:

- A) Written tests on the contents of the theoretical program. To overcome it, a uniform and balanced knowledge of all the included material will be necessary.
- B) Assistance and active participation in the activities carried out.
- C) Perform and active participation in the practices
- D) Perform and active participation in the class exercises.
- E) Perform and active participation in seminars.
- F) Autonomous work and oral presentation, if applicable.

Written tests: Elimination control, with qualification from 6.5 or more: March 22, 2018. Final control: May 21, 2018. Extraordinary convocation: July 4, 2018.

Practical classes: daily compulsory attendance, in order to overcome them, the results obtained must be submitted at the end of each session, as well as a brief discussion on the interest of the techniques used and the advantages and disadvantages they present.

Final grade: will be the compendium of the qualifications obtained in the First Partial, in the Second Partial, in the practices, as well as in the work of course that will reflect the participation and the use of the student in the development of the same.

Percentage over Final Score:

- Evaluation of the theoretical contents of the first partial: 45%; Of the second partial: 45%.
- In the event that the first partial is suspended: the suspended or non-submitted classification (in which case it would be 0): 20%; Grade of the second partial (that would be the end with the whole subject): 70%.
- Evaluation of practical classes, seminars, attendance to classes and other options of active participation of the student: 10%.

DESCRIPTION OF THE TESTS THAT WILL BE PART OF THE FINAL SINGLE EVALUATION ESTABLISHED IN THE "RULES OF EVALUATION AND QUALIFICATION OF STUDENTS OF THE UNIVERSITY OF GRANADA"

In order to qualify for the "Final Single Assessment", the student must follow the currently procedure set out in article 8.2 of the "Regulations for the evaluation and qualification of students of the UGR".



The final final evaluation will consist of a written examination of the contents of the theoretical syllabus of the subject and an examination of the contents of the practives syllabus, which may include development or multiple-choice questions, as well as the experimental laboratory. Therefore it is recommended to carry out the practices, for which you must agree with the teachers.

In order to pass the subject it is essential to pass the examination of theoretical contents obtaining at least a score of 5 out of 10. It is also essential to pass the practices test obtaining at least a score of 5 out of 10.

- The final grade of the subject will be obtained from the theory note, which will suppose up to 90% of the final grade, and the grade of practice that will suppose up to 10% of the final grade.

ADDITIONAL INFORMATION

