

Parasitology

Code: 100833
ECTS Credits: 6

2024/2025

Degree	Type	Year
2500251 Environmental Biology	OT	4

Contact

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Teachers

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Teaching groups languages

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Prerequisites

There is no official prerequisite, but in order to take this course it is recommended to previously study and review general concepts of Zoology, Zoology Extension, Ecology and Cell Biology and Histology of previous years.

Objectives and Contextualisation

On successfully completing this course, students will be able to demonstrate knowledge about parasitic species in terms of specific and general characteristics, systematics, adaptations, biological cycles... and interpret and understand their importance in the species biodiversity and the complexity of their contribution to the ecological level. In addition, they will be able to understand the effect that parasites have on the health of their hosts and ecosystems and their role in modelling the ecology of their hosts, from different points of view: populations, communities as well as trophic networks. Finally, they will be aware of the usefulness of parasites as biomarkers in population and biological studies of their hosts and environment.

Competences

- Communicate efficiently, orally and in writing.
- Develop planning and organisation skills.
- Focus on quality.
- Obtain, observe, handle, cultivate and conserve specimens.
- Perform biological diagnoses.

- Recognise and interpret the development, growth and biological cycles of the principal groups of living beings.
- Sample, characterise and manipulate populations and communities.
- Take account of social, economic and environmental impacts when operating within one's own area of knowledge.
- Take sex- or gender-based inequalities into consideration when operating within one's own area of knowledge.

Learning Outcomes

1. Actuar en l'àmbit de coneixement propi avaluant les desigualtats per raó de sexe/gènere.
2. Collect and identify animal organisms.
3. Communicate efficiently, orally and in writing.
4. Design and execute samplings of animal populations and communities in their habitats.
5. Develop planning and organisation skills.
6. Focus on quality.
7. Identify and treat the principal diseases caused by fungi: their symptoms and the corresponding biological cycles.
8. Recognise and interpret the different phases in the biological cycles of all animal groups.
9. Take account of social, economic and environmental impacts when operating within one's own area of knowledge.

Content

This subject is structured into the following sections:

I. GENERAL CONCEPTS

1. Parasitism. Basic concepts in parasitology. Categories of parasitism. Inlet, contact and penetration pathways of the parasites. Parasitic pathways.
2. Life cycles of parasites. Types of guests and parasites. Adaptations to parasitism.

II. DIVERSITY OF PARATED GROUPS

3. Protists: Flagellates (Diplomonadida, Parabasalida, Kinetoplastida), Alveolata (Apicomplexa, Ciliates), Amoebozoa, Opisthokonta (Microsporidia). Myxozoa. Generalities, diversity, life cycles, pathogenesis, and ecological role.
4. Platyhelminths: Trematodes, Monogenean, Cestodes. Acanthocephalans. Generalities, diversity, life cycles, pathogenesis, and ecological role.
5. Nematodes. Parasitic Arthropods: Crustaceans, Arachnids, Insects. Generalities, diversity, life cycles, pathogenesis, and ecology paper.
6. Other groups with parasitic species: Sponges, Mesozoa, nematomorphs, annelids, molluscs, and chordates. Generalities, diversity, life cycles, pathogenesis, and ecological role.

III. ADAPTATIONS AND EVOLUTION OF PARASITISM

7. Origin and evolution of parasitic life: gradual adaptation to parasitism. Direct origin of parasitism. Origin of ectoparasitism and endoparasitism. Microhabitat of parasites. Origin of life cycles. Evolutionary and ecological consequences of complex life cycles. Origin of intermediate guests. Chains and trophic networks.
8. Specificity. Origin and degrees of parasitic specificity. Determinants and patterns of specificity. Parasitic evolution - host: macro-volatile and micro-metabolic patterns.

9. Parasitic balance - host. Host exploitation strategies. Guest strategies for parasites. Evasion of the immune response. Virulence

IV. PARASITARY ECOLOGY AND BIOGEOGRAPHY

10. Introduction to parasitic ecology. Hierarchical nature of populations and communities of parasites.

11. Parasitic populations. Density-dependent regulatory factors and independent factors of density. Intraspecific interactions

12. Effect of parasites on host populations. Regulation of guest populations. Epidemiological implications. Behavioural changes. Hitchhiking.

13. Parasitic communities. Types of parasites in communities. Interspecific relationships and their effect on niche selection.

14. Parasitic biogeography. Factors related to the geographical distribution of parasites.

V. SANITARY ASPECTS AND UTILITY OF PARSaits FOR THE HUMAN BEING

15. Main zoonoses. Interest and classification. Foodborne zoonoses and transmitted by water, the problem of the use of wastewater. Environmental and food health measures. Emergencies and / or re-emergencies due to environmental changes.

16. Principal parasitism. The problems of agricultural and livestock production, invasive species, and protected areas.

17. Parasites as indicators of the biology of their hosts, of ecological stocks and of environmental deterioration.

Activities and Methodology

Title	Hours	ECTS	Learning Outcomes
Type: Directed			
Laboratory classes	20	0.8	5, 4, 6, 7, 8, 2
Lectures	24	0.96	7, 8
Seminars	8	0.32	1, 9, 3, 5, 6, 7, 8
Type: Supervised			
Tutorials	6	0.24	7, 8
Type: Autonomous			
Preparation of works and resolution of questions	33	1.32	1, 9, 5, 6, 7, 8
Study and resolution of problems	52	2.08	1, 9, 5, 6, 7, 8

The course applies the following methodology:

Lectures:

The contents will be taught mainly by the teacher with the support of videos and animations related to the topics discussed in class and/or with activities to assess student learning, by solving issues raised by the

teacher. The visual aids used in class will be available in the Campus Virtual. With these lectures the student acquires the basic scientific-technical knowledge of the course, but it should be complemented with the personal study of the topics explained. It is advised that students consult regularly the books recommended in the Bibliography section to consolidate and clarify, if necessary, the contents explained in class.

Seminars:

The seminars work on the scientific-technical knowledge exposed in the lectures to complement their understanding, developing several activities such as the analysis and discussion of audiovisual material or scientific articles, the resolution of issues related to the topics, analysis of parasitological information, talks by professionals, etc. The seminars are characterized by the active work of the student and their aim is to promote the capacity for analysis and synthesis, critical reasoning and problem-solving capacity. In addition, a small part of the contents will also be explained by the students during the seminars with a work that must be presented as an oral presentation to the rest of the students.

Laboratory classes:

The students perform the experimental work individually or in pairs and under the supervision of the professor. Before beginning each practice session, the student must have read the practice guideline to know the objectives of the practice, the basics, and the procedures that they must perform and the protocol that they must develop. The objective of the laboratory classes is to complement and reinforce the knowledge acquired with lectures and seminars. Practical sessions will be stimulated and developed in the student empirical skills such as the ability to observe, analyse and recognize parasitological diversity. At the beginning of each laboratory class there will be an introduction explaining the theoretical foundations of the practice to be performed. At the end of each practice the students will answer a questionnaire.

The laboratory classes consist of:

- 3 sessions of 3h to get acquainted with the identification of different taxonomic groups.
- 2 sessions of 4h destined to work the process of obtaining and preparing the parasitological material. In addition, calculations will also be made for the estimation of parasitological parameters necessary when it comes to quantitatively describing the level of infestation by a species of parasite that is the basis for any subsequent ecological study.
- 1 session of 3 h in the audiovisual room where the joint behaviour of populations of parasites and hosts will be studied according to simple population models through computer simulations.

Tutorials:

The purpose of these sessions is to resolve doubts, clarify basic concepts and guide the sources consulted by the students. Likewise, these tutorials allow the orientation of the work that the students will do for the seminars.

Annotation: Within the schedule set by the centre or degree programme, 15 minutes of one class will be reserved for students to evaluate their lecturers and their courses or modules through questionnaires.

Assessment

Continous Assessment Activities

Title	Weighting	Hours	ECTS	Learning Outcomes
Laboratory classes	30%	2.5	0.1	5, 4, 6, 7, 8, 2
Seminars	20%	0	0	1, 9, 3, 5, 6, 7, 8
Theory	50%	4.5	0.18	1, 9, 5, 7, 8

The assessment of this subject is continuous, through different activities:

Assessment of the theory classes:

There are two partial tests and a second-chance test.

Partial exams: In this part, the students' knowledge of the subject will be assessed individually, as well as their capacity for analysis and synthesis, and of critical reasoning. There will be 2 partial exams (a mark of at least 5 out of 10 is required to successfully pass the partial exam).

Second-chance test: Students who failed one or both partial exams can reassess them. The student must previously have submitted a minimum of two-thirds of the course-assessment items.

Therefore, students will obtain the "Not assessable" qualification when the assessment activities carried out have a weighting of less than 67% in the final grade. Likewise, students who wish to improve the grade of one or both partial exams can be re-assessed. Be aware that in this case, previous mark will be lost.

The mark corresponding to the two exams has a global weight of 50% of the final mark (25% each partial test)

Assessment of seminars:

Both oral works (content, capacity for synthesis, rigor in the expression, quality of documentary sources and timing) and written activities are assessable, as well as the participation and assistance during the seminars. In addition, the topics discussed during seminars may be included in partial exams.

The mark corresponding to the seminars has a global weight of 20% of the final mark.

Assessment of the laboratory classes:

After each practice the student will perform an individual test that assess the use and achievement of the specific competences and the contents of each practice. Likewise, the involvement of the students in the activities during the practices will also be valued. Attendance at practical sessions is mandatory. Students will be classified as "Not assessable" when their absence exceeds 20% of the scheduled sessions.

The mark corresponding to the laboratory classes has a global weight of 30% of the final mark.

Final Considerations:

A minimum mark of 4 is required in each of the different parts to successfully pass the subject.

Students will obtain the "Not assessable" qualification when the assessment activities carried out have a weighting of less than 67% in the final mark.

This course does not foresee the one single assessment system.

Bibliography

Books:

- BUSH, A.O., FERNANDEZ, J.C., ESCH, G.W., SEED, J.R. (2001). *Parasitism. The Diversity and Ecology of Animal Parasites*. Cambridge University Press, Cambridge.
- CHENG TC (1986) *General Parasitology*, 3rd ed. Academic Press, New York.
- ESCH G.W., FERNÁNDEZ J.C. (1993). *A functional biology of parasitism. Ecological and evolutionary implications*. Chapman & Hall, London.
- GÁLLEGO-BERENGUER (2006). *Manual de Parasitología. Morfología y biología de los parásitos de interés sanitario*. Publicacions i edicions de la Universitat de Barcelona
- GUNN A, PITT SJ (2014). *Parasitology. An integrated Approach*. Wiley-Blackwell, UK
- POULIN, R. (2007) *Evolutionary ecology of parasites*. Princeton University Press, Princeton.

- POULIN, R., MORAND S. (2004) Parasite Biodiversity. Smithsonian Books, Washington.
- HALTON D.W., BEHNKE J.M., MARSHALL I. (EDS) (2001) Practical exercises in parasitology. Cambridge University Press.
- ROBERTS, L.S., JANOVY, J. JR. (2000). Foundations of Parasitology ,6th Edition, Wm. C.Brown Publishers, Dubuque.
- SCHMID-HEMPEL, P (2014) Evolutionary Parasitology. The integrated study of infections, immunology, ecology and genetics. Oxford, New York.
- SULLIVAN J.T. (2000). *Electronic Atlas of Parasitology*. McGraw Hill.

On-line books:

- Veterinary parasitology: <https://mirades.uab.cat/ebs/items/show/192797>
- Human parasitology: <https://mirades.uab.cat/ebs/items/show/155209>

Websites:

- <http://tolweb.org/tree>
- <http://www.dpd.cdc.gov/dpdx/Default.htm>
- <http://asp.unl.edu/index.php>

Software

No specific software is used in this subject, only free online softwares such as: Quantitative Parasitology (QP 3.0) and Populus 6.0.

Language list

Name	Group	Language	Semester	Turn
(PLAB) Practical laboratories	241	Catalan/Spanish	second semester	afternoon
(PLAB) Practical laboratories	242	Catalan/Spanish	second semester	afternoon
(SEM) Seminars	241	Spanish	second semester	morning-mixed
(SEM) Seminars	242	Spanish	second semester	morning-mixed
(TE) Theory	24	Spanish	second semester	morning-mixed