



IDENTIFYING DATA

Marine microbiology and parasitology

Subject	Marine microbiology and parasitology			
Code	V10G060V01906			
Study programme	(*)Grao en Ciencias do Mar			
Descriptors	ECTS Credits	Choose	Year	Quadmester
	6	Optional	3rd	2nd
Teaching language	Spanish			
Department				
Coordinator	García Estévez, José Manuel			
Lecturers	García Estévez, José Manuel Longo González, Elisa			
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General description	<p>It should be kept in mind that parasitism is the most widespread life strategy in nature. The study of the impact of parasitism can provide relevant information for a better management and exploitation of resources. This is why we describe the diversity of parasitic animals in all their manifestations and the adaptations of each species to their habitat and study the parasite-host relationships: anatomy, morphology, biology, epidemiology, diagnosis and treatment.</p> <p>Microbiology will deal with aspects related to microbial contamination, the infectious pathology of marine organisms and the applications of marine microorganisms.</p>			

Competencies

Code	
C11	To manage the use of littoral and coastal region and their resources in a sustainable way
C17	Ability to survey in the field and to work in the laboratory responsibly and safely, encouraging team work
C18	To transmit writing, verbal and graphical information for audiences of various types
C20	To find and evaluate marine resources of various kinds
C22	To control marine pollution problems
C23	To design, control and manage recovery centers for threatened marine species
C26	To plan, direct and write technical reports on marine issues
C27	To understand the operation details of enterprises linked to the marine environment, and to recognize their specific problems and solutions
C30	Identify and assess environmental impacts in the marine environment
C32	Quality control of seafood
C33	Fisheries control
C34	To design, control and manage aquaculture production plants
C35	Water quality control in water treatment plants
C36	aquariology
D8	Teamwork ability
D15	Ability to apply knowledge in practice

Learning outcomes

Expected results from this subject	Training and Learning Results
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Acquire basic knowledge of Parasitology and identify the main pathogenic parasite groups of marine organisms.	C18 C22 C23 C26 C27 C30 C32 C33 C34 C35 C36	D8 D15
Know and purchase skill in the technicians of diagnostic in Parasitology.	C11 C17 C22 C23 C26 C27 C30 C32 C33 C34 C36	D15
Understand the complexity of the biological cycles of the parasites of the half marine like key appearance for the control of the parasitic illnesses	C23 C26 C30 C32 C33 C34 C35 C36	D15
Know the importance and the possible applications of the main parasites of the half marine	C11 C22 C26 C30 C32 C33 C34 C35 C36	D8 D15
Know the main strategies of control of the parasitic illnesses	C22 C27 C32 C35	
To know the importance and the possible applications of the main parasites of the marine environment. Implications in public health and fisheries.	C18	
Know the microbial activities in relation with the half biotic and abiotic	C32 C34 C35	D8
To know the main infectious diseases by marine microorganisms.	C30 C32	
Know how to interpret the origin and consequences of polluting microorganisms in the marine environment.	C18 C22 C30	
Possess general notions on the interest applied of the microorganisms of the half marine	C11 C17 C18 C20 C22 C23 C26 C27 C30 C32 C34 C36	D8 D15

Contents

Topic

PART I. INTRODUCTION AND GENERAL CONCEPTS	I.1. Parasitology and Marine Parasitology. Concept of parasitism. Adjustments to the parasitism. Actions of the parasite on the host. Parasite specificity. Parasites and biological cycles. I.2. Ecological terms in Parasitology.
PART II. PROTROZOOLOGY	II.1. Introduction to the study of the parasitic protozoans. Classification of Protozoos. II.2. Dinoflagellates. Flagellates. Amoeboae. Apicomplexa. Ciliates. II.3. Microsporidia. II.4. Mixosporidia. II.5. Protozoa of bivalve mollusks: Perkinsus, Haplosporidia, Marteilia.
PART III. HELMINTHS AND ARTHROPODS	III.1. Flatworms : Monogenean . Digeneans Tapeworms. Turbellarian. III.2 . Roundworms : Nematodes. Acanthocephala. III.3. Crustacea.
PART IV. RESPONSE HOST - PARASITE	IV.1 . Defense mechanisms of marine organisms against parasites. IV.2 . Production of vaccines against parasites. IV.3 . Drug treatments. Chemical products.
PART V. APPLICATIONS OF MARINE PARASITOLOGY	V.1 . Parasites as biological markers. V.2 . Applications of parasites in the control of fishing operations : Its use in differentiating stocks. V.3 . Economic and hygienic importance of marine parasites.
PART VI . MICROBIAL CONTAMINATION IN THE MARINE ENVIRONMENT	VI.1 . Public Health Risks and biotic pollution of the marine environment. VI.2 . indigenous bacteria and microorganisms introduced by waste disposal. VI.3 . Waterborne infections. Microorganisms indicators of health control methods coastal waters and marine food products. VII.4 . Wastewater treatment and purification of water supplies.
PART VII . MECHANISMS OF MICROBIAL PATHOGENICITY	VII.1. Mechanisms microbial pathogenicity. VII.2. Major bacterial and viral infections of marine organisms. VII.3. Métodos diagnostic and identification of microbial pathogens. VII.4. Prophylaxis in aquaculture.
PART VIII . INDUSTRIAL APPLICATIONS OF MICRO MARINE ENVIRONMENT	VIII.1. Search and genetic manipulation of microorganisms. VIII.2. Principal uses of marine microorganisms for industrial purposes. VIII.3. Use of microorganisms in biodegradation and bioremediation of marine pollutants. VIII.4. Harmful effects of marine microorganisms : biodeterioration biofilms and metal and wood.

Planning			
	Class hours	Hours outside the classroom	Total hours
Lecturing	20	30	50
Laboratory practical	20	43.88	63.88
Seminars	8.5	25.5	34
Objective questions exam	0.62	0	0.62
Problem and/or exercise solving	1.5	0	1.5
*The information in the planning table is for guidance only and does not take into account the heterogeneity of the students.			

Methodologies	
	Description
Lecturing	Professor structure and/or explain the objectives and content of each block. For their study, students have seen in class presentations and worksheets for each topic in the platform Faitic
Laboratory practical	Explanation of the theoretical foundations and practical protocols , overseeing its implementation and resolving doubts raised by students. The practices will focus on techniques useful in the practice of the profession.
Seminars	Discussion, processing and/or exposure by groups of students of subjects related to the theory and practices of matter. Topics will be proposed to the students individually or in groups organized. Before the dates marked for the exhibition, each group of students must submit a written report of the work done to prepare.

Personalized assistance	
Methodologies	Description
Lecturing	The doubts that have the students will be attended in class

Laboratory practical	In the laboratory, will be participatory and allow to set custom actions reinforcement. While performing laboratory practices teachers give individual attention to each student for the correct understanding of the experimental objectives and methodology or technique used.
Seminars	In the seminars: Development and exposure by groups of students of subjects related to the theory and practices of matter. Students willing so could attend personal tutorials to solve doubts and/or uncertainties, which will mainly take place during the timetables indicated. To better optimise the procedure, the student is requested to previously contact his/her teacher with reasonable anticipation. Tutorials: Prof. García Estévez: Tuesday, Wednesday and Thursday from 9:00 to 11:00 h. Prof. Longo González: Monday, Tuesday and Wednesday from 16:00 to 18:00 h.

Assessment				
	Description	Qualification	Training and Learning Results	
Laboratory practical	The knowledge acquired by students in practical classes will be evaluated by test type / short question organized in two tests corresponding to the contents of Microbiology and Marine Parasitology (30 %). Also it is evaluable attitude and skill shown in the laboratory (10%).	45	C17 C22 C26 C27 C30 C32 C33 C34 C35 C36	D8 D15
Seminars	The quality of the memory of the works presented, the quality of the exhibition and participation and discussion in each of the topics will be valued.	20	C18 C23 C26 C27	D8 D15
Objective questions exam	The theoretical knowledges purchased by the student are evaluated by means of an examination of type test and short questions, organized in two corresponding proofs to the contained of Microbiology and Marine Parasitology	15	C11 C17 C18 C20 C22 C23 C26 C27 C30 C32 C33 C34 C35 C36	D8 D15
Problem and/or exercise solving	Resolution of problems and cases related with the contained of the Microbiology and Marine Parasitology.	20	C17 C22 C26 C27 C30 C32 C33 C34 C35 C36	D8 D15

Other comments on the Evaluation

The student to pass the subject shall: 1) Perform all mandatory workshops and seminars. To overcome the matter only a fault is allowed, because of force majeure and documented. 2) Get a score of 5 out of 10 in each of the Parasitology and Microbiology parties and a minimum score of 4 out of 10 in each of the evaluable activities. If the June overcomes one of the parties it is kept for July . In successive courses surpassed the ratings of activities be preserved. Students are required to take this course in responsible and honest behavior. Any form of fraud (copying and / or plagiarism) intended to falsify the level of knowledge and skills achieved in any type of test, report or work is considered inadmissible. Fraudulent conduct may involve suspending the course during a full course. An internal record of these actions will be kept so that, in case of recidivism, request the opening to the rectorado of a disciplinary file.

Date, time and place of exams will be published in the official web of Marine Sciences
Faculty: <http://mar.uvigo.es/index.php/en/alumnado-actual-2/examenes-3>

Sources of information

Basic Bibliography

Eiras, J.; Segner, H.; Wahli, T. & Kapoor, B.G., **Fish Diseases**, 2008

Rohde, K., **Marine Parasitology**, 2005

M.T. Madigan; J.M. Martinko; K.S. Bender; D.H. Buckley; D.A. Stahl & T. Brock, **Brock Biology of Microorganisms**, 14, 2015

J.M. Willey; L.M. Sherwood & C.J. Woolverton, **Prescott Microbiology**, 10, 2017

Munn, C. B., **Marine Microbiology Ecology and Applications. (2ª Edición)**, 2011

Patrick T.K. Woo & Kurt Buchmann, **Fish Parasites: Pathobiology and protection**, 2012

Complementary Bibliography

Goater, T.M.; Goater, C.M. & Esch, G.W., **Parasitism: The Diversity and ecology of animal parasites**, 2, 2013

L. Roberts J. Janovy, Jr. & S. Nadler, **Foundations of Parasitology**, 9, 2013

Williams, H. & Jones, A., **Parasitic Worms of Fish**, 1994

Woo, P.T.K., **Fish Diseases and Disorders. Volumen 1. (2ª Edición). Protozoan and Metazoan Infections.**, 2006

Noga, E. J., **Fish Disease. Diagnosis and treatment**, 2010

Loker, E.S. & Hofkin, B.V., **Parasitology: A Conceptual Approach**, 2015

Austin, B., **Infectious Disease in Aquaculture**, 2012

LeBoffe, M.J. & Pierce, B.E., **Microbiology: Lab Theory and Application**, 4, 2015

Recommendations

Other comments

As it is an optional subject that can be taken by all the students of the degree in Marine Sciences, previous knowledge is not considered necessary, beyond the knowledge acquired in the subjects of Principles of Marine Microbiology (V10G060V01404) and Marine Zoology (V10G060V01405)

His knowledge can be applied to the study of Biological Oceanography (V10G060V01601), Fisheries (V10G060V01703), Aquaculture (V10G060V01801) or the Biology of Fish and Shellfish (V10G060V01902)

Contingency plan

Description

=== EXCEPTIONAL PLANNING ===

Given the uncertain and unpredictable evolution of the health alert caused by COVID-19, the University of Vigo establishes an extraordinary planning that will be activated when the administrations and the institution itself determine it, considering safety, health and responsibility criteria both in distance and blended learning. These already planned measures guarantee, at the required time, the development of teaching in a more agile and effective way, as it is known in advance (or well in advance) by the students and teachers through the standardized tool.

=== ADAPTATION OF THE METHODOLOGIES ===

MIXED TEACHING SCENARIO

In accordance with the forecasts and recommendations communicated by the Centre and the Rectorate, in the mixed teaching scenario, teaching planning and teaching and assessment methodologies (including their respective percentages and specific comments) will be maintained as set out in the original Teaching Guide (face-to-face modality). With regard to theoretical teaching (master classes and seminars), students enrolled will be divided into the groups necessary to respect the recommended safety distances, taking into account the physical classroom (Aula Integra) assigned to teach the subject, according to the guidelines of the Rector's Office, the Occupational Risk Prevention Service and the Centre itself. Shifts will be established, so that each group will rotate equally through the Integrated Classroom to attend the class taught by the teacher, while students from other groups who are not in the physical classroom that day will be able to follow the class, in a synchronized manner, through the Remote Campus, thanks to the technical solutions enabled by the Rectorate in the Integrated Classrooms.

As for the practical teaching, it will be carried out in a face-to-face way, in groups of no more than 20 students, respecting scrupulously the safety and protection measures established by the Occupational Risk Prevention Service and the Centre itself.

DISTANCE LEARNING SCENARIO

In the event that the health situation involves a new closure of the facilities for the students, the subject will be taught in a non-presential way. For this purpose, the Remote Campus set up by the University for this type of situation and the FaiTIC tele-teaching platform will be used. Regarding the teaching of theoretical contents (master classes and seminars), both the planning and the methodologies included in the original Teaching Guide will be respected (face-to-face mode), since the virtual classrooms of the Remote Campus allow not only the perfect teaching of master classes by the teaching staff but also

the giving of presentations by the students (practical cases of seminars). With regard to practical teaching, we will try to replace classroom teaching by combining the following activities/methodologies: 1) Specific virtual sessions where teachers will explain the basic foundations of the main techniques of the subject. 2) Visualization of videos uploaded or recommended by the teaching staff and consultation/search for support information related to these techniques and the interpretation of their results. These tasks will correspond to the student's personal work. 3) Setting up questionnaires/exercises with practical situations/problems that the students will have to solve based on the knowledge and competences previously acquired in the other two activities (it may be necessary in some cases to read additional material). This last activity, which will also involve the student's personal work, will be used as a methodology to evaluate the student's acquisition of knowledge and skills related to practical teaching.

The evaluation of theoretical content will be addressed through the resolution of periodic questionnaires and the rest of the evaluation methodologies will be identical to those reflected in the original Teaching Guide (classroom-based), maintaining the same percentages of weight for the final grade (questionnaires/practice exercises, 45%; seminars, 20%; problem solving, 20% and theoretical knowledge, 15%). The rest of the criteria that appear in the section "other comments on the evaluation" of the original Teaching Guide will also be respected (face-to-face mode).

ATTENTION TO STUDENTS

Both in the mixed teaching scenario and, mainly, in the non-attendance teaching scenario, the tutorial sessions will be carried out by telematic means (e-mail, videoconference systems, FaiTIC forums, etc.) in all cases by appointment.
