



IDENTIFYING DATA

Marine microbiology and parasitology

Subject	Marine microbiology and parasitology			
Code	V10G061V01411			
Study programme	Grado en Ciencias del Mar			
Descriptors	ECTS Credits	Choose	Year	Quadmester
	6	Optional	4th	2nd
Teaching language	Spanish			
Department				
Coordinator	García Estévez, José Manuel			
Lecturers	García Estévez, José Manuel			
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Web				
General description	<p>It should be borne in mind that parasitism is the most widespread life strategy in nature. The study of the impact of parasitism can provide important information for better management and exploitation of resources. Thus, this subject describes the diversity of parasitic animals in all their manifestations and the adaptations of each species to its habitat, and studies parasite-host relationships: anatomy, morphology, biology, epidemiology, diagnosis and treatment.</p> <p>The Microbiology module will deal with aspects related to biological contamination, microbial pathogens in aquaculture and the biotechnological potential of marine microbiota.</p>			

Training and Learning Results

Code				
A1	Students have demonstrated knowledge and understanding in a field of study that builds upon their general secondary education, and is typically at a level that, whilst supported by advanced textbooks, includes some aspects that will be informed by knowledge of the forefront of their field of study			
A2	Students can apply their knowledge and understanding in a manner that indicates a professional approach to their work or vocation, and have competences typically demonstrated through devising and sustaining arguments and solving problems within their field of study			
A3	Students have the ability to gather and interpret relevant data (usually within their field of study) to inform judgments that include reflection on relevant social, scientific or ethical issues			
A4	Students can communicate information, ideas, problems and solutions to both specialist and non-specialist audiences			
B1	Know and use vocabulary, concepts, principles and theories related to oceanography and apply everything learned in a professional and/or research environment.			
B4	Manage, process and interpret the data and information obtained both in the field and in the laboratory.			
C9	Acquire basic knowledge about the structural and functional organization and the evolution of marine organisms.			
C10	Know the biological diversity and functioning of marine ecosystems.			
C11	Apply the knowledge and techniques acquired to the characterization and sustainable use of living resources and marine ecosystems.			
D1	Develop the search, analysis and synthesis of information skills oriented to the identification and resolution of problems.			
D2	Acquire the ability to learn autonomously, continuously and collaboratively, organizing and planning tasks over time.			
D5	Sustainability and environmental commitment. Equitable, responsible and efficient use of resources.			

Expected results from this subject

Expected results from this subject	Training and Learning Results			
Know and purchase skill in the technicians of diagnostic in Parasitology.	A2	B4	C11	D1
Understand the complexity of the biological cycles of the parasites of the marine environment like key appearance for the control of the parasitic diseases.	A4	B1	C9 C10	D5
Know the importance and the possible applications of the main parasites of the aquatic marine environment. Implications in public health and fisheries.	A3	B4	C11	D5

Know the main strategies of control of the parasitic illnesses	A2	B4	C11	D1
Know and know handle documentary sources related with the Parasitology of the aquatic environment	A1			D1 D2
Know the microbial activities in relation with the half biotic and abiotic	A2	B4	C11	D1
Know the main illnesses infectious diseases by marine microorganisms	A1	B4	C11	D1
Know interpret the origin and consequences of the microorganisms in the aquatic environment	A3	B4	C11	D1
Possess general notions on the interest applied of the microorganisms of the half marine	A3	B4	C11	D5

Contents

Topic	
BLOCK I. INTRODUCTION AND GENERAL CONCEPTS	I.1. Parasitology and Marine Parasitology. Concept of parasitism. Adaptations to the parasitism. Actions of the parasite on the host. Parasite specificity. Parasites and biological cycles. I.2. Ecological terms in Parasitology.
BLOCK II. PROTOZOA	II.1. Introduction to the study of the Protozoa parasites. Classification Protozoa. II.2. Dinoflagellates. Flagellates. Amoeboae. Apicomplexa. Ciliates. II.3. Microsporidia. II.4. Myxosporidia. II.5. Protozoa of bivalve molluscs: Perkinsus, Haplosporidia, Marteilia.
BLOCK III. HELMINTHS AND ARTHROPODS	III.1. Plathelminths: Monogenea. Digenea. Cestoda. Turbellaria. III.2. Nematelminths: Nematoda. Acanthocephala. III.3. Crustacea.
BLOCK IV. APPLICATIONS OF THE MARINE PARASITOLOGY	IV.1. The parasites as biological markers. IV.2. Applications of the parasites in the control of the fisheries: His employment in the differentiation of stocks. IV.3. Economic and hygienic importance of the marine parasites.
BLOCK V. MICROBIAL POLLUTION IN THE MARINE ENVIRONMENT	V.1. Types of pollutants biological that access to the marine aquatic environment. V.2. Causes and consequences of the biological pollution in coastal waters. V.3. Control and Monitoring of the biological pollution in coastal waters. V.4. Methods of quantification of Microorganisms indicators in waters and foods of marine origin.
BLOCK VI. INFECTIOUS ICTIOPATHOLOGY: PROCARIOTS and VIRUSES	VI.1. Host-pathogen environment interaction. VI.2. Pathogenicity and virulence factors. VI.3. Main pathogens in aquaculture and mariculture. VI.4. Microbiological diagnosis. VI.5. Prevention and treatment. Antibiotherapy. Alternative methods. Immunostimulation.
BLOCK VII. BIOTECHNOLOGICAL POTENTIAL OF THE MARINE MICROBIOTA	VII.1. Bioactive compounds of marine origin. VII.2. Molecular techniques applied to bioprospecting. VII.3. Bioremediation of marine pollutants. VII.4. Biofouling: Microbial process and antifouling treatments.

Planning

	Class hours	Hours outside the classroom	Total hours
Lecturing	20	30	50
Laboratory practical	20	50	70
Seminars	10	20	30

*The information in the planning table is for guidance only and does not take into account the heterogeneity of the students.

Methodologies

	Description
Lecturing	The teachers of the subject structure and/or explain the objectives and contents of each block. For their study, students have at their disposal the presentations seen in class and support cards for each topic, in the Moovi platform.
Laboratory practical	Their completion is mandatory in order to pass the subject. In them, the teacher gives an explanation of the theoretical foundations and protocols of the practices, supervising their execution and solving the doubts that the students may have. The practices will deal with useful techniques in the practice of the profession.
Seminars	Their realization is mandatory. In them, topics related to the theory and practices of the subject are discussed, elaborated and presented (individually or in groups). Topics will be proposed to be prepared by the students.

Personalized assistance

Methodologies	Description
Lecturing	Any doubts that students may have will be answered in class or during tutoring hours. The student will be able to attend personalized tutorials to solve doubts, mainly in the schedules that are indicated and arranging an appointment with the professors previously, by e-mail.
Laboratory practical	They will be participative and will allow to establish personalized reinforcement actions. During the realization of the laboratory practices the teachers will give individualized attention to each student for the correct understanding of the experimental objectives and of the methodology or technique used.
Seminars	Elaboration and exposition by groups of students of topics related to the theory and practices of the subject. The student will be able to attend personalized tutorials to solve doubts, mainly in the schedules that are indicated and arranging appointment with the professors previously, by e-mail.

Assessment						
	Description	Qualification	Training and Learning Results			
Lecturing	The theoretical knowledge acquired by the student will be evaluated by means of different multiple-choice tests and short questions, organized in tests corresponding to the contents of Parasitology (20%) and Microbiology (20%).	40	A1 A2	B1	C9 C10 C11	D5
Laboratory practical	The knowledge acquired by the student in the practical classes will be evaluated by means of multiple-choice tests/short questions and resolution of exercises, organized in tests corresponding to the contents of Parasitology (20%) and Microbiology (20%). Attendance is mandatory to pass the course.	40	A3 A4	B1 B4	C9 C10 C11	D1 D5
Seminars	They are compulsory. The quality of the memory of the works presented, the quality of the exposition and the active participation in them will be valued (Parasitology 10%; Microbiology 10%).	20	A1 A4	B1	C10	D1 D2 D5

Other comments on the Evaluation

To pass the subject it will be necessary:

A) In continuous evaluation:

1) To attend the practices and seminars of the two modules of the subject.

2) Obtain a minimum grade of 5 points out of 10 in each of the activities (Theory, Practicals and Seminars) of the two modules that compose it. A minimum grade of 4 points will be admitted in a single activity for each module, as long as the final average of the subject equals or exceeds 5 points. If the subject is not passed in its entirety, the highest grade of the activities not passed will be reflected in the final grade.

In the second call: The grades of the tests passed in the first call will be kept for the second call, evaluating the students of the activities not passed.

B) In global evaluation:

1. The student will request it within the period established by the center.

2. The student will not be able to request the global evaluation if he/she has not carried out the practices and seminars of the subject whose attendance is obligatory.

3. Both in the first and in the second call, students who choose this type of evaluation will be evaluated of all the contents of the subject, having to obtain to pass the subject a minimum grade of 5 points out of 10 in each of the modules.

Students who take this subject are required to behave responsibly and honestly. Any form of fraud (copying and/or plagiarism) aimed at falsifying the level of knowledge and skills achieved in any type of test, report or work is considered inadmissible. Fraudulent conduct may result in the student being suspended from the course for a full academic year. An internal record of these actions will be kept so that, in case of recurrence, a disciplinary file may be requested from the rector's office.

The date, time and place of the evaluation tests will be published on the official website of the Faculty of Marine Sciences: <http://mar.uvigo.es/alumnado/examenes>

Sources of information

Basic Bibliography

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- 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

When treating of a matter *optativa, that can be *cursada by all the students of the degree in Sciences of the Sea, do not consider necessary previous knowledges further of the purchased in the matters of Principles of Marine Microbiology (V10G061V01208) and Marine Zoology (V10G061V01210) already *cursadas previously.

The knowledges that the student purchases in the matter can be him of big utility and application in other disciplines, as they are the Biological Oceanography (V10G061V01306), *Pesquerías (V10G061V01405), Aquaculture (V10G061V01310) or the Biology of fish and seafoods (V10G061V01407).