



IDENTIFYING DATA

Principles of marine microbiology

Subject	Principles of marine microbiology			
Code	V10G061V01208			
Study programme	Grado en Ciencias del Mar			
Descriptors	ECTS Credits	Choose	Year	Quadmester
	6	Mandatory	2nd	2nd
Teaching language	Spanish			
Department				
Coordinator	Bodelón González, Gustavo			
Lecturers	Bodelón González, Gustavo			
E-mail	gbodelon@uvigo.gal			
Web	http://https://mar.uvigo.es/			
General description	Basic introduction to marine microorganisms and their place in the living world. Estructure and function of bacterial cell. Methods for study of marine microbiology. Metabolic and genetic traits exclusives for procariotic microorganisms. Physiology and diversity of microbial communities. Microbial role in trophic chain and ocean processes. Interaction of microorganisms with living organisms and geobiochemical cycles.			

Training and Learning Results

Code	
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			
Understand the concept of microorganism, its structural characteristics and its position on the biological scale	A4	B1 B4	C9	D1
Understand and know how to apply the different techniques of study of the marine microbiota	A2 A3	B4	C11	D1 D5
Know the diversity of the marine microbiota and know how to interpret its role in marine ecosystems in relation to the trophic chain and cycles of the elements	A4	B1	C10 C11	
Know and know how to interpret the characteristics of microbial growth in the marine environment, the influence of environmental factors and symbiotic processes with marine organisms	A2 A3 A4	B1	C11	D2

Contents	
Topic	
Lesson 1. Microorganisms on the marine ambient	1.1. Purpose and field of study of marine microbiology 1.2. Microorganisms on the biological scale. 1.3. Role of microbiota in marine ecosystems. 1.4. Perspectives of marine microbiology
Lesson 2. Structure and function of prokaryotic microorganisms and acellular agents	2.1. Structure and function of prokaryotic microorganisms 2.2. Structure and function of acellular agents
Lesson 3. Microbial physiology	3.1. Microbial growth in the laboratory: mathematical expression 3.2. Microbial growth in the marine environment: effect of environmental factors 3.3. Cooperative and multicellular processes 3.4. Asexual reproduction in bacteria
Lesson 4.- Methods of study of marine microbiota: culture-dependent techniques	4.1. Concepts of asepsis and sterilisation 4.2. Sampling techniques. 4.3. Isolation, cultivation and conservation techniques .4.4. Techniques of cuantification. 4.5. Techniques for the characterisation of pure cultures.
Lesson 5.- Methods of study of marine microbiota: non-cultivation dependent techniques	5.1. U.V. light microscopy: unespecific fluorescence . 5.2. Flow Cytometry 5.3. In Situ Hybridization Techniques 5.4. Selective Amplification and sequencing: PCR; DGGE; NGS sequencing techniques 5.5. Principles of Metagenomic Analysis
Lessons 6. Diversity of marine microbiota.	6.1. Relevant species in the Bacteria, Archaea and Eucarya domains. Position in the phylogenetic tree. 6.2. Microorganisms in the trophic chain. 6.3. Microorganisms in the element cycles 6.4 Symbiotic associations with animals and plants 6.5. Diversity of Viruses and Bacteriophages Role in marine microbial ecosystems
LABORATORY PRACTICAL	1. Preparation of culture media 2. Sampling of environmental samples 3. Isolation and preservation of pure cultures 4. Cuantification of microorganisms 5. Tests of bacterial identification.

Planning

	Class hours	Hours outside the classroom	Total hours
Lecturing	30	68	98
Laboratory practical	18	28	46
Seminars	4	2	6

*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 teacher structures and/or explains the objectives and contents of each topic and responds to the questions posed by the students. At final for each topic, the students will have at their disposal at Fatic the presentations discussed in the classroom, demonstration videos and links to free access texts. During the semester the teacher will evaluate the students by means of five tests of a maximum of 20 minutes each, with developmental and objective questions and exercises. Any tests that are missed or not taken may be made up in the second call.
Laboratory practical	The teacher explains the fundamentals and protocols of the practice, supervises its execution and solves the doubts of the students. The students will have a Practice Guide with the protocols and fundamentals of each practice. The teacher will evaluate the students at the end to the week by means of a single test of objective questions, which, in case of failure, can be recovered in the final exam of the first and/or second call.
Seminars	The students, organized in groups, will make a work to the computer that they will have to deliver at the end of the seminar for its evaluation. The teacher explains the procedure to follow and advises on the development of the work. The work will be handed in at the end of the seminar and will be used by grade the student.

Personalized assistance

Methodologies	Description
Laboratory practical	The students will be able to solve doubts with the teacher, during the practices or once finished, making an appointment by e-mail within their tutorial schedule, indicated on the faculty website and/or on the MOOVI platform. To better optimize the procedure, the student is requested to contact the teacher in advance by email, with reasonable anticipation.
Seminars	The students will be able to solve doubts with the professor during the development of the seminar.
Lecturing	The students can solve doubts with the teacher, during the classes or out of them, making an appointment by e-mail within their tutorial schedule, indicated on the faculty website and/or on the MOOVI platform. To better optimize the procedure, the student is requested to contact the teacher in advance by email, with reasonable anticipation.

Assessment						
	Description	Qualification	Training and Learning Results			
Lecturing	Four partial tests, eliminatory along the semester of multiple choice, and/or development questions: Test 1: 14%. Test 2: 14%. Test 3: 14%. Test 4: 14%. Failed tests, or not presented, are retaken in the Second Call. - The dates of the different exams can be found in the Schedule available by the Deanship to disposal of the student. - Exceptionally, the students can opt by a Global Assessment (see further down)	56	A2 A3 A4	B1 B4	C9 C10	D1 D5
Laboratory practical	Final exam, of objective questions, at the end of the practices. Failed exam, or not presented, is retaken in the Second Call.	34	A2 A3	B4	C10	D1 D5
Seminars	Seminar I (5%): delivery of a group work. Seminar II (5%): individual written test of short/essay questions. Both the work and the test will be performed during the seminars. Neither the group work, nor the individual test, will be retaken.	10	A3 A4	B4	C9 C10	D1 D2

Other comments on the Evaluation

CONTINUOUS ASSESSMENT:

- The students will have to pass, with at least 5 points out of 10, each one of the five partial examinations (four of Theory and one of Practices). In case of not reaching the minimum note in any of the partial proofs, the qualification in Records (First Call) will be always the average note of the failed partial examinations. Students will be able to retake in Second Call only the failed partial examinations, keeping the grades approved during the semester

GLOBAL ASSESSMENT:

Exceptionally, students who decide to do so and communicate it within the period established by the center, may apply for Global Assessment and take the full subject exam only in a global exam at the end of the semester (and/or in Second Call).

IN BOTH MODALITIES OF ASSESSMENT:

The students who, having failed the global examination or any of the partial tests of the semester, do not appear for their retaken in Second Call will appear in the Records as "Not Presented".

To pass the subject, students must attend Laboratory Practices. A single lack of attendance is allowed, if documentally justified.

Date of final exams: <https://mar.uvigo.es/alumnado/examenes/>

Students are strongly requested to fulfil a honest and responsible behaviour. It is considered completely unacceptable any alteration or fraud (i.e., copy or plagiarism) contributing to modify the level of knowledge and abilities acquired in exams, evaluations, reports or any kind of teacher's proposed work. Fraudulent behaviour may cause failing the course for a whole academic year. An internal dossier of these activities will be built and, when reoffending, the university rectorate will be asked to open a disciplinary record

Sources of information

Basic Bibliography

Josep M. Gasol J.M., David L. Kirchman, **Microbial Ecology of the Oceans**, 3th ed, Wiley Blackwell, 2.18

MUNN, C.B., **Marine Microbiology : Ecology and Applications**, 2nd ed., Garland science, 2011

Madigan, M.T. , K. S. Bender, D. H. Buckley, W.M. Sattley, D. A. Stahl., **Brock Biology of Microorganisms**, 16th ed., Pearson Education, 2022

Complementary Bibliography

Madigan, M. Martinko, J. M., Bender, K. y otros, **Brock Biology of Microorganisms**, 14th ed, Pearson Education, 2015

Willey, J.M., Sherwood, L. M. & otros, **Prescott Microbiology**, 10 th ed., Mcgraw-Hill Education, 2017

Johnson, T. R. & otros, **Laboratory Experiments in Microbiology**, 11th ed, Pearson, 2016

Recommendations

Subjects that continue the syllabus

Marine microbiology and parasitology/V10G061V01411
