



## Information about the subject

**Degree:** Bachelor of Degree in Marine Sciences

**Faculty:** Faculty of Veterinary Medicine and Experimental Sciences

**Code:** 272006 **Name:** Marine Microbiology

**Credits:** 6,00 **ECTS Year:** 2 **Semester:** 2

**Module:** Transversal Knowledge and Techniques in Marine Sciences

**Subject Matter:** Organisms and Systems **Type:** Compulsory

**Department:** Oceanography and Environment

**Type of learning:** Classroom-based learning

**Languages in which it is taught:** Spanish

### Lecturer/-s:

272A Miguel Martí Jiménez (**Responsible Lecturer**)

miguel.marti@ucv.es



## Module organization

### Transversal Knowledge and Techniques in Marine Sciences

Subject Matter	ECTS	Subject	ECTS	Year/semester
Organisms and Systems	30,00	Marine Botany	6,00	2/2
		Marine Ecology	6,00	3/2
		Marine Microbiology	6,00	2/2
		Marine Zoology	6,00	2/1
		Physiology of Marine Organisms	6,00	2/2
Marine Geology	12,00	Geophysics and Tectonics	6,00	2/1
		Sedimentology	6,00	2/2
Geographic Information Systems and Remote Sensing	6,00	Geographic Information Systems and Remote Sensing	6,00	2/1
Statistics	6,00	Applied Statistics	6,00	2/1

## Recommended knowledge

Chemistry and biology knowledge.



## Learning outcomes

At the end of the course, the student must be able to prove that he/she has acquired the following learning outcomes:

- R1      The student values the importance of Mediterranean communities and their complexity by showing sensitivity to their conservation and protection.
- R2      The student knows and uses basic techniques for the collection of organisms in coastal sampling.
- R3      The student is able to work in a laboratory performing correctly the basic operations both in the planning and development of each of the laboratory practices.
- R4      The student knows and understands with a critical attitude, the concepts that are included in the subject of microbiology.



## Competencies

Depending on the learning outcomes, the competencies to which the subject contributes are (please score from 1 to 4, being 4 the highest score):

BASIC		Weighting			
		1	2	3	4
CB2	Students are able to apply knowledge to their work in a professional way and have the competences enabling them to state and defend views and opinions as well as perform problem-solving tasks in their field of study.	X			
CB5	Students develop the necessary learning skills to undertake further studies with a high level of autonomy.			X	

GENERAL		Weighting			
		1	2	3	4
CG1	Capacity to analyze and synthesize			X	
CG2	Capacity to organize and plan		X		
CG3	Mastering Spanish oral and written communication				X
CG5	Knowing and applying Basic ITC skills related to marine science	X			
CG6	Capacity to manage information (capacity to look for and analyze information coming from different types of sources)			X	
CG7	Decision making	X			
CG8	Capacity to work in interdisciplinary and multidisciplinary team			X	
CG10	Critical and self-critical capacity	X			
CG11	Capacity to learn				X
CG12	Capacity to adapt to new situations		X		



CG13	Capacity to produce new ideas (creativity)	x			
CG16	Capacity to apply theoretical knowledge				x
CG18	Sensibility to environmental issues.				x

SPECIFIC		Weighting			
		1	2	3	4
CE2	Knowing basic sampling techniques of water column, organisms, sediment and sea-bottoms as well as basic techniques of dynamic and structural variable measurement			x	
CE7	Collecting, assessing, processing and interpreting oceanographic data, following the most recent theories	x			
CE8	Identifying and analyzing new problems and proposing solution strategies	x			
CE9	Knowing how to carry out experiments and measurements both in the laboratory and during sample collection			x	
CE11	Knowing how to do fieldwork and laboratory experiments in a safe and responsible way, promoting teamwork				x
CE13	Looking for and assessing different kinds of marine resources		x		



## Assessment system for the acquisition of competencies and grading system

Assessed learning outcomes	Granted percentage	Assessment method
R1, R2, R3, R4	50,00%	Written test with theoretical and practical questions
R1, R4	20,00%	Delivery of guided assignments, whose objectives and contents will be proposed by the teacher
R2, R3, R4	20,00%	Laboratory test
R1, R4	10,00%	Oral presentation

### Observations

Spelling mistakes, grammatical inconsistencies and sms language appearing in works, exams or other evaluation instruments will result in a discount on the final score of the evaluation instrument.

In order to apply all the percentages indicated in the previous table, the student will have to obtain in each part a score equal to or greater than 5, except for some work according to the lecturer's criteria.

The practices are mandatory.

3% of the qualification of the practical laboratory test will consist of the attitude of the student in the practices.

### MENTION OF DISTINCTION:

According to Article 22 of the Regulations governing the Evaluation and Qualification of UCV Courses, the mention of "Distinction of Honor" may be awarded by the professor responsible for the course to students who have obtained, at least, the qualification of 9 over 10 ("Sobresaliente"). The number of "Distinction of Honor" mentions that may be awarded may not exceed five percent of the number of students included in the same official record, unless this number is lower than 20, in which case only one "Distinction of Honor" may be awarded.



## Learning activities

The following methodologies will be used so that the students can achieve the learning outcomes of the subject:

- M1 Teacher presentation of contents, analysis of competences, explanation and in-class display of skills, abilities and knowledge.
- M2 Group work sessions supervised by the professor. Case studies, diagnostic tests, problems, field work, computer room, visits, data search, libraries, on-line, Internet, etc. Meaningful construction of knowledge through interaction and student activity.
- M3 Activities carried out in spaces with specialized equipment.
- M4 Supervised monographic sessions with shared participation.
- M5 Application of multidisciplinary knowledge.
- M6 Personalized and small group attention. Period of instruction and/or guidance carried out by a tutor to review and discuss materials and topics presented in classes, seminars, readings, papers, etc.
- M8 Set of oral and/or written tests used in initial, formative or additive assessment of the student.
- M9 Group preparation of readings, essays, problem-solving, seminars, papers, reports, etc. to be presented or submitted in theoretical , practical and/or small-group tutoring sessions. Work done on the university e-learning platform ([www.plataforma.ucv.es](http://www.plataforma.ucv.es) )
- M10 Student's study: Individual preparation of readings, essays, problem-solving, seminars, papers, reports, etc. to be presented or submitted in theoretical, practical and/or small-group tutoring sessions. Work done on the university e-learning platform ( [www.plataforma.ucv.es](http://www.plataforma.ucv.es) ).



## IN-CLASS LEARNING ACTIVITIES

	LEARNING OUTCOMES	HOURS	ECTS
ON-CAMPUS CLASS M1	R1, R4	33,00	1,32
PRACTICAL CLASSES M2	R2, R3, R4	7,00	0,28
LABORATORY M3	R2, R3, R4	9,00	0,36
SEMINAR M4	R1, R4	3,00	0,12
GROUP PRESENTATION OF ASSIGNMENTS M5	R1, R4	2,00	0,08
TUTORIAL M6	R1, R2, R3, R4	4,00	0,16
ASSESSMENT M8	R1, R2, R3, R4	2,00	0,08
<b>TOTAL</b>		<b>60,00</b>	<b>2,40</b>

## LEARNING ACTIVITIES OF AUTONOMOUS WORK

	LEARNING OUTCOMES	HOURS	ECTS
GROUP WORK M9	R1, R2, R3, R4	18,00	0,72
INDEPENDENT WORK M10	R1, R4	72,00	2,88
<b>TOTAL</b>		<b>90,00</b>	<b>3,60</b>





## Description of the contents

Description of the necessary contents to acquire the learning outcomes.

### Theoretical contents:

Content block	Contents
DIDACTIC UNIT 1	<p>CHAPTER 1. Introduction to Microbiology. What is Marine Microbiology?.</p> <p>CHAPTER 2. Methods of study of microorganisms. Methods in marine microbiology.</p> <p>CHAPTER 3. Structure and function in prokaryotes and eukaryotes.</p> <p>CHAPTER 4. Nutrition and microbial metabolism.</p> <p>CHAPTER 5. Growth and environment.</p>
DIDACTIC UNIT 2	<p>CHAPTER 6. Major groups of prokaryotes, viruses and fungus.</p>
DIDACTIC UNIT 3	<p>CHAPTER 7. The role of microbes in ocean processes.</p> <p>CHAPTER 8. Interactions of microorganisms with other aquatic organisms.</p> <p>CHAPTER 9. Diseases caused by marine microorganisms.</p> <p>CHAPTER 10. Microbiological contamination of the marine environment.</p> <p>CHAPTER 11. Beneficial and harmful effects of marine microorganisms.</p>



## DIDACTIC UNIT 4

Practice 1. Laboratory of Microbiology. Preparation of culture media.

Practice 2. Isolation and growth of microorganisms.

Practice 3. Microscopy. Stains.

Practice 4. Determining the microbiological contamination of the marine environment.

Practice 5. Bacterial activities and identification.

Practice 6. Determination of the sensitivity of bacteria to antimicrobial agents. Antibigram.

Practice 7. Analysis and interpretation of results.

### Organization of the practical activities:

	Content	Place	Hours
PR1.	Laboratory of Microbiology. Preparation of culture media.	Laboratory	2,00
PR2.	Isolation and growth of microorganisms.	Laboratory	2,00
PR3.	Microscopy. Stains.	Laboratory	2,00
PR4.	Determining the microbiological contamination of the marine environment.	Laboratory	2,00
PR5.	Bacterial activities and identification.	Laboratory	2,00
PR6.	Determination of the sensitivity of bacteria to antimicrobial agents. Antibigram.	Laboratory	2,00
PR7.	Analysis and interpretation of results.	Lecture room	4,00



## Temporary organization of learning:

Block of content	Number of sessions	Hours
DIDACTIC UNIT 1	9,00	18,00
DIDACTIC UNIT 2	11,00	22,00
DIDACTIC UNIT 3	2,00	4,00
DIDACTIC UNIT 4	8,00	16,00



## References

KIRCHMAN, D.L. *Microbial Ecology of the Oceans*. Wiley-Liss. 2000.

GASOL, J.M. *Microbial Ecology of the Oceans*. 3ª edición. Wiley-Blackwell, 2018.

MADIGAN, M.T., MARTINKO, J.M., DUNLAP, P.V., CLARK, D.P. *Brock Biología de los microorganismos*. 12ª edición. Pearson, 2009.

MADIGAN, M.T., MARTINKO, J.M., BENDER, K.S., BUCKLEY, D.H., STHAL, D.A.. *Brock Biología de los microorganismos*. 14ª edición. Pearson, 2015.

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NIETO, T. P. *Conceptos basicos de Microbiología marina*. Universidad de Vigo. Servicio de publicaciones, Ed. Vigo, 2001

PEDRÓS-ALIÓ, C. *La vida al límite*. Ed. CSIC, 2013.

PRESCOTT, L.M., HARLEY, J.P., KLEIN, D.A. *Microbiología*. 5ª edición. McGraw-Hill-Interamericana de España, S.A.U, 2004.

TORTORA, G. J., FUNKE, B.R., CASE C.L. *Introducción a la Microbiología*. 9ª edición. Médica Panamericana, 2007.

TORTORA, G. J., FUNKE, B.R., CASE C.L. *Introducción a la Microbiología*. 12ª edición. Médica Panamericana, 2017.

WILLEY, J.M., SHERWOOD, L.M. & WOOLVERTON, C.J. *Microbiología de Prescott, Harley y Klein*. 7ª edición. McGraw-Hill-Intermaericanade España, S.A.U, 2009.

WILLEY, J.M., SANDMAN, k. & WOOD, D. (2020). *Prescott's Microbiology*. McGraw-Hill.



## Addendum to the Course Guide of the Subject

Due to the exceptional situation caused by the health crisis of the COVID-19 and taking into account the security measures related to the development of the educational activity in the Higher Education Institution teaching area, the following changes have been made in the guide of the subject to ensure that Students achieve their learning outcomes of the Subject.

**Situation 1: Teaching without limited capacity** (when the number of enrolled students is lower than the allowed capacity in classroom, according to the security measures taken).

In this case, no changes are made in the guide of the subject.

**Situation 2: Teaching with limited capacity** (when the number of enrolled students is higher than the allowed capacity in classroom, according to the security measures taken).

In this case, the following changes are made:

### 1. Educational Activities of Onsite Work:

All the foreseen activities to be developed in the classroom as indicated in this field of the guide of the subject will be made through a simultaneous teaching method combining onsite teaching in the classroom and synchronous online teaching. Students will be able to attend classes onsite or to attend them online through the telematic tools provided by the university (videoconferences). In any case, students who attend classes onsite and who attend them by videoconference will rotate periodically.

In the particular case of this subject, these videoconferences will be made through:

☒ Microsoft Teams

☐ Kaltura



## **Situation 3: Confinement due to a new State of Alarm.**

In this case, the following changes are made:

### **1. Educational Activities of Onsite Work:**

All the foreseen activities to be developed in the classroom as indicated in this field of the guide of the subject, as well as the group and personalized tutoring, will be done with the telematic tools provided by the University, through:

☒ Microsoft Teams

☐ Kaltura

Explanation about the practical sessions:

Classroom practices and laboratory practices will be carried out by Teams using the didactic material that the lecturer considers.



## 2. System for Assessing the Acquisition of the competences and Assessment System

### ONSITE WORK

#### Regarding the Assessment Tools:

☒ The Assessment Tools will not be modified. If onsite assessment is not possible, it will be done online through the UCVnet Campus.

☐ The following changes will be made to adapt the subject's assessment to the online teaching.

Course guide		Adaptation	
Assessment tool	Allocated percentage	Description of the suggested changes	Platform to be used

The other Assessment Tools will not be modified with regards to what is indicated in the Course Guide.

#### Comments to the Assessment System:



Spelling mistakes, grammatical inconsistencies and sms language appearing in works, exams or other evaluation instruments will result in a discount on the final score of the evaluation instrument.

In order to apply all the percentages indicated in the previous table, the student will have to obtain in each part a score equal to or greater than 5, except for some work according to the lecturer's criteria.

3% of the qualification of the practical laboratory test will consist of the attitude of the student in the practices. This part will be evaluated exclusively through the completion of the practice notebook.