



Information about the subject

Degree: Bachelor of Science Degree in Marine Sciences

Faculty: Faculty of Veterinary Medicine and Experimental Sciences

Code: 273003 **Name:** Marine Ecology

Credits: 6,00 **ECTS Year:** 3 **Semester:** 2

Module: Transversal Knowledge and Techniques in Marine Sciences

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

Department: Basic and Transversal Sciences

Type of learning: Classroom-based learning

Languages in which it is taught: English, Spanish

Lecturer/-s:

273A	<u>Jose Rafael Garcia March</u> (Responsible Lecturer)	jr.garcia@ucv.es
	<u>Jose Tena Medialdea</u>	josetena@ucv.es
CAUR	<u>Jose Tena Medialdea</u> (Responsible Lecturer)	josetena@ucv.es
273GIQ	<u>Jose Tena Medialdea</u> (English Responsible Lecturer)	josetena@ucv.es
	<u>Jose Rafael Garcia March</u>	jr.garcia@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

Basic knowledge and skills in marine biology and biological oceanography



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 is able to work in a laboratory performing correctly the basic operations both in the planning and development of each of the laboratory practices.
- R2 The student knows the basic concepts of ecology, populations, communities and energy flows in ecosystems.
- R3 The student elaborates schemes, simple models or conceptual maps on the organization of ecosystems and their functioning.
- R4 The student uses and understands the main methodologies for the study of ecological systems and models.
- R5 The student is able to identify the main components of marine ecological systems in the field.
- R6 The student prepares reports and makes valid judgments about coastal marine ecosystems.
- R7 The student identifies the main marine communities on the coastal coastline.
- R8 The student relates the theoretical and practical contents through the papers and tasks which were assigned to him/her.
- R9 The student understands conceptually and values the importance of Marine Ecology in the context of current science and oceanography in particular.



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

CE6 Applying marine instrument techniques

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

CE10 Knowing how to use planning, designing and implementing research tools while surveying and assessing results

x

CE11 Knowing how to do fieldwork and laboratory experiments in a safe and responsible way, promoting teamwork

x

CE12 Describing, classifying and mapping sea bottoms and coastal areas

x

CE13 Looking for and assessing different kinds of marine resources

x

CE22 Practical experience of methods of marine environmental impact assessment

x



Assessment system for the acquisition of competencies and grading system

Assessed learning outcomes	Granted percentage	Assessment method
R2, R3, R4, R9	40,00%	Written test with theoretical and practical questions
R1, R2, R3, R4, R5, R6, R7, R8, R9	30,00%	Delivery of guided assignments, whose objectives and contents will be proposed by the teacher
R1, R4, R5, R7, R8	20,00%	Laboratory test
R2, R3, R4, R5, R6, R7, R8, R9	10,00%	Oral presentation

Observations

The weighted average necessary to pass the subject will be equal to or greater than 5. It is possible to weight the final grade in the case that in an item is obtained between 4 and 4.99 points, the rest must be at least 5 points.

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)
- 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).



IN-CLASS LEARNING ACTIVITIES

	LEARNING OUTCOMES	HOURS	ECTS
ON-CAMPUS CLASS M1	R2, R3, R4, R7, R9	29,00	1,16
PRACTICAL CLASSES M2	R1, R2, R3, R4, R5, R8, R9	16,00	0,64
LABORATORY M3	R1, R3, R4	6,00	0,24
SEMINAR M4	R2, R5, R7, R8, R9	3,00	0,12
GROUP PRESENTATION OF ASSIGNMENTS M5	R2, R6, R8, R9	2,00	0,08
TUTORIAL M6	R2, R3, R4, R5, R6, R7, R8, R9	2,00	0,08
ASSESSMENT M8	R2, R3, R4, R5, R6, R7, R8, R9	2,00	0,08
TOTAL		60,00	2,40

LEARNING ACTIVITIES OF AUTONOMOUS WORK

	LEARNING OUTCOMES	HOURS	ECTS
GROUP WORK M9	R1, R2, R3, R4, R5, R6, R7, R8, R9	18,00	0,72
INDEPENDENT WORK M10	R2, R3, R4, R6, R8, R9	72,00	2,88
TOTAL		90,00	3,60



Description of the contents

Description of the necessary contents to acquire the learning outcomes.

Theoretical contents:

Content block	Contents
UNIT 1. Fundamentals of Marine Ecology	CONTENTS BLOCK 1. Ecology: Basic concepts: populations, communities, ecosystems. Evolutionary and thermodynamic ecology. Global ecology.CB2. Ecosystem: Basic compartments. Energy flows and matter cycles. Scales and hierarchy. Synthesis and degradation. Metabolic diversity Models in marine ecology. Environmental factors in the distribution of marine ecosystems.
UNIT 2. The Population Ecology of Marine organisms	CB3. Population: growth, mortality and survival. Growth models. Leslie MatrixCB4. Demography. Generation and cohort. Life Tables. Survival Curves. Net reproduction rate and generation time. Life cycles. Species distributions and age pyramids.CB5. Colonization and extinction. Metapopulations Dynamics: basic model and modifications. Global model of a metapopulation. Community dynamics: isolated ecosystems. CB6. Niche and Competition. Competition, habitat and niche. Niche as hyperspace. Amplitude and niche overlap. Pre and postinteractive niche. Niche Segregation Character displacement. Interspecific and intraspecific competition. General model of interspecific competition. Competitive exclusion principle.CB7. Predation. Predator-prey system. Predation models. Lotka-Volterra Model. Coevolution.
UNIT 3. Marine Communities Ecology	CB8. Community. Units, associations, biocenosis. Benthic Ecology Gradients Abundance and diversity of species. Models. Diversity indices Abundance, diversity and heterogeneity. Diversity, biodiversity and ecodiversity. Alometry and individual size.CB9. Succession and stability of communities. Succession models: hard substrate, soft substrate, plankton. Succession, diversity and stability. Biogeography.



UNIT 4. Matter and Energy in Marine Ecosystems

CB10. Trophic levels. Trophic structure Pyramids and Trophic chains, energy transfer and ecological efficiency. Trophic network models. Microbial loop
CB11. Primary and Secondary Production. Measurement and efficiency. Environmental factors. Growth equations Methods for estimating secondary production. Regeneration / recycling of nutrients. Plankton-benthos relationship. Organic matter export.

Organization of the practical activities:

	Content	Place	Hours
PR1.	Oceanographic Campaign Pobla de Farnals Soft Bottoms.	Boat	2,00
PR2.	Benthic communities. Calp (Alicante): Oceanographic week.	Marine station	10,00
PR3.	Sorting, identification and description of benthic samples	Laboratory	2,00
PR4.	Ecological data analysis	Computer	8,00
PR5.	Ecological models	Lecture room	10,00

Temporary organization of learning:

Block of content	Number of sessions	Hours
UNIT 1. Fundamentals of Marine Ecology	3,00	6,00
UNIT 2. The Population Ecology of Marine organisms	14,00	28,00
UNIT 3. Marine Communities Ecology	7,00	14,00
UNIT 4. Matter and Energy in Marine Ecosystems	6,00	12,00



References

- BARNES, R.S.K. & K.H. MANN. (1992). Fundamentals of aquatic ecology. Blackwell, Sci. Publ.
- BEGON, M., TOWNSEND, C. R. H., JOHN, L., COLIN, R. T., & JOHN, L. H. (2006). Ecology: from individuals to ecosystems. Blackwell Sci. Publ.
- BOWMAN, W.D., HACKER, S.D. (2020). Ecology. Oxford University Press.
- CASTRO, P.; M.E. HUBER. (2010). Marine biology. McGraw-Hill, 614pp.
- COGNETTI, G., SARA, M. & MAGAZZU, G. (2001). Biología Marina, Ariel Ciencia.
- COSTA, M, et al., (1984). Estado actual de la flora y fauna marinas en el litoral de la Comunidad Valenciana. Premios Ciudad de Castellón. Publicaciones Exmo. Ayto. de Castellón de la Plana. 209 pp.
- ELEFThERIOU, A & MCINTYRE, A. D. (2005). Methods for the study of marine benthos. -Reino Unido : Blackwell Science
- FALKOVSKI, A; D. WOODHEAD. (1992). Primary productivity and biogeochemical cycles in the sea. N. 37. Springer, 550pp.
- GARRISON, T. (2010). Oceanography: an invitation to marine science. Cengage Learning, 588pp.
- HARRIS, G. P. (1986). Phytoplankton Ecology. Structure, function and fluctuation. London. Chapman & Hall.
- KAISER, M.J., ATTRILL, M.J., JENNINGS, S., THOMAS, D. (2020). Marine Ecology: Processes, Systems, and Impacts. Oxford University Press
- KREBS, C. J. (1989). Ecological methodology (No. QH541. 15. S72. K74 1999.). New York: Harper & Row.
- LEVINTON, J.S. (1981) Marine Ecology. Prentice-Hall
- LUDWIG, J. A., & REYNOLDS, J. F. (1988). Statistical ecology: a primer in methods and computing (Vol. 1). John Wiley & Sons.
- MEADOWS, P. S. & CAMPBELL, J. L. (1981). Introducción a la ciencia del mar Ed. Acribia, SA.
- MANN, K.H. & J.LAZIER. (2004). Dynamics of marine ecosystems. Blackwell. Sci.Publ.
- MARGALEF, R. (1998). Ecología. Omega.
- PERES, J.M.; J. PICARD, 1964. Nouveau manuel de bionomie benthique de la Mer Méditerranée. Rec. Trav. Sta. Mar. Endoume, 31(47):1-137.
- RODRÍGUEZ, J. (2013). Ecología. 3ª Edición. Pirámide.
- SMITH, R.L. and T.M. SMITH. (2000). Ecología. 4ª Edición. Addison Wesley.
- SOUTHWOOD, T. R. E., & HENDERSON, P. A. (2009). Ecological methods. John Wiley & Sons.
- TAIT, R. V., & DIPPER, F. (1998). Elements of marine ecology. Butterworth-Heinemann.
- THURMAN. H.V. (2005). Marine biology. Herbert H. Webber.
- TOWNSEND, D.W. (2012). Oceanography and Marine Biology: an introduction to Marine Science. Sinauer Ass. USA.
- VALIELA, I. (2015). Marine Ecological Processes. Springer-Verlag.



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

Blackboard Collaborate Ultra



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

Blackboard Collaborate Ultra

Kaltura

Explanation about the practical sessions:

In the case of confinement due to a new state of alarm, all practical sessions requiring the student's presence, including Oceanographic Week, will be moved to a new date as soon as the health situation allows. If it is not possible to carry out classroom activities (such as boat or laboratory practices), these will be replaced by online sessions and video-tutorials on the techniques to be used, and the analysis and guided discussion of the results based on data provided by the professor.



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: