



Information about the subject

Degree: Bachelor of Degree in Marine Sciences

Faculty: Faculty of Veterinary Medicine and Experimental Sciences

Code: 272001 **Name:** Marine Botany

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: English, Spanish

Lecturer/-s:

272A Maria Garcia Sanz (**Responsible Lecturer**)

m.garcia@ucv.es

Jorge Juan Vicedo

jorge.juan@ucv.es

272GIQ Maria Garcia Sanz (**English Responsible Lecturer**)

m.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

It has not established



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 knows the different morphologies and levels of organization , reproduction and vital cycles of marine flora.
- R2 The student can distinguish the different studied algal groups and their characteristics.
- R3 The student values the importance of Mediterranean communities and their complexity by showing sensitivity to their conservation and protection.
- R4 The student knows and uses basic techniques for the collection of organisms in coastal sampling.
- R5 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.



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	
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	



Assessment system for the acquisition of competencies and grading system

Assessed learning outcomes	Granted percentage	Assessment method
R1, R2, R3	50,00%	Written test with theoretical and practical questions
R1, R2, R3, R4, R5	25,00%	Delivery of guided assignments, whose objectives and contents will be proposed by the teacher
R1, R2, R4, R5	15,00%	Laboratory test
R2, R3	10,00%	Oral presentation

Observations

A minimum score of 5 points is required on all evaluable items to average.

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	R1, R2, R3	33,00	1,32
PRACTICAL CLASSES M2	R2, R3, R4, R5	9,00	0,36
LABORATORY M3	R1, R2, R4, R5	9,00	0,36
SEMINAR M4	R2, R3	2,00	0,08
GROUP PRESENTATION OF ASSIGNMENTS M5	R2, R3	3,00	0,12
TUTORIAL M6	R1, R2, R3, R4, R5	2,00	0,08
ASSESSMENT M8	R1, R2, R3, R4, R5	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	18,00	0,72
INDEPENDENT WORK M10	R1, R2, R5	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
1. Introduction to Marine Botany	Concept of alga and general characteristics. Morphology and levels of organization of the marine flora. The algal cell. Photosynthesis and photosynthetic pigments. Types of reproduction. Life cycles. Habitat and Ecology. Clasification: systematic, taxonomy and nomenclature.
2. Microalgae.	Cell organization. Main groups. Reproduction and biological cycles. Systematic and Taxonomy. Ecology and distribution. More representative genus.
3. Macroalgae.	Cell organization. Main groups. Reproduction and biological cycles. Systematic and Taxonomy. Ecology and distribution. More representative genus
4. Vascular plants.	Cell organization. Anatomical and morphological adaptations to the marine environment. Main groups. Reproduction and biological cycles. Systematic and Taxonomy. Ecology and distribution. More representative genus
5. Uses and applications of marine flora	Traditional uses, Food and agriculture. Industrial uses. Potential Uses: Algae aquaculture, algae as bioindicators. Production of energy convertible biomass, wastewater treatment.
6. Harmful effects of the marine flora.	Invasive species. Harmful Algal Blooms (HAB).



Organization of the practical activities:

	Content	Place	Hours
PR1.	Practice 1. Levels of organization of plant species	Laboratory	2,00
PR2.	Practice 2. Departure by boat. Collection of phytoplankton organisms	Boat	2,00
PR3.	Practice 3. Recognition of phytoplanktonic organisms	Laboratory	2,00
PR4.	Practice 4. Study of the most representative genera of algae Pargas in the Mediterranean.	Laboratory	2,00
PR5.	Practice 5. Study of the most representative genera of algae reds in the Mediterranean	Laboratory	2,00
PR6.	Practice 6. Study of the most representative genera of algae Greens in the Mediterranean.	Laboratory	2,00
PR7.	Practice 7. Field trip. Sampling techniques, collection, handling and conservation of algal material.	Field visit	4,00



Temporary organization of learning:

Block of content	Number of sessions	Hours
1. Introduction to Marine Botany	8,00	16,00
2. Microalgae.	8,00	16,00
3. Macroalgae.	8,00	16,00
4. Vascular plants.	2,00	4,00
5. Uses and applications of marine flora	2,00	4,00
6. Harmful effects of the marine flora.	2,00	4,00



References

- *Cabioc'h, J., Floc'h, J-Y., Le Toquin, A., Boudouresque, C-F., Meinesz, A. Et Verlaque, M., (1995). Guía de las algas de los mares de Europa: Atlántico y Mediterráneo. Ed. Omega. Barcelona. 249 pp.
- *Carrillo, J. A., Sanson, M. (2000). Algas, hongos y fanerógamas marinas de las Islas Canarias: clave analítica. Universidad La Laguna.
- **Cormaci, M., Furnari, G., Catra, M., Alongi, G., Giaccone, G., (2012). Flora marina bentónica del Mediterraneo: Phaeophyceae. Boll. Accad. Gioenia Sci. Nat., 45 (375) 1-508.
- **Cormaci, M., Furnari, G., Alongi, G., (2014). Flora marina bentónica del Mediterraneo: Chlorophyta. Boll. Accad. Gioenia Sci. Nat., 47 (377) 11-436.
- *Dawes, C.J., (1998). Marine botany. Ed. John Wiley & Sons.
- Gómez Garreta, A., (2001). Flora phycologica iberica. 1. Fucales. Universidad de Murcia, 192 pp.
- *Graham, L.E., Graham, J.M., Wilcox, L.W., (2009). Algae. 2e. Benjamin Cummings (Pearson), San Francisco, CA.
- **Green E.P., Short F.T. (2003). World Atlas of Seagrasses. University of California Press, Berkeley, CA. 298 pag.
- **Guiry, M.D., Guiry, G.M., (2013). AlgaeBase. World-wide electronic publication, National University of Ireland, Galway. <http://www.algaebase.org>
- Hogarth P. (2007). The Biology of Mangroves and Seagrasses. Oxford University Press.
- *Hoppenrath, M., Elbrächter, M., Drebes, G., (2007). Marine Phytoplankton: Selected Microphytoplankton. Species from the North Sea around Helgoland and. Sylt. Schweizerbart Science Publishers, Stuttgart,. Germany, 264 pp.
- *Izco, J. (ed.), 2004. Botánica (2ª Edición). Mc Graw Hill Interamericana. ISBN 10: 8448606094 / ISBN 13: 9788448606091.
- *Kraberg, A., Baumann, M., Dürselen, C.D., (2010). Coastal phytoplankton: photo guide for northern european seas. Verlag Dr. Friedrich Pfeil, Munchen, Germany. 204pp.
- * Larink, O. and Westheide, W., (2014). Coastal Plankton: Photo Guide for European Seas. Verlag Dr Friedrich Press. 191 pag.
- *Larkum A.W.D., Orth R.J., Duarte C.M., (2007). Seagrasses: Biology, Ecology and Conservation, Springer, 2ed.: 691 pag.
- *Littler, M., (2003). Handbook of phycological methods. Ecological field methods: macroalgae. Cambridge University Press, Cambridge.
- Riosmena-Rodríguez, R., Nelson, W., Aguirre J., (2017) Rhodolith/Maërl Beds: A Global Perspective. Coastal Research Library, vol 15. Springer, Cham.
doi:10.1007/978-3-319-29315-8_11.
- *Rodríguez-Prieto, C., Ballesteros, E., Boisset, F., Afonso-Carrillo, J. (2013). Guía de las macroalgas y fanerógamas marinas del Mediterráneo Occidental. Omega, 656 pp.
- Round, F. E., Crawford, R. M., Mann, D. G., (1990). The Diatoms: Biology and Morphology of the Genera. Cambridge University Press, Cambridge.
- *Ruiz, J.M., Guillén, J.E., Ramos Segura, A. & Otero, M.M. (Eds) (2015). Atlas de las praderas



marinas de España. IEO/IEL/ UICN, Murcia-Alicante-Málaga, 681 pp

*Strasburger, et al. (2003). Tratado de Botánica. Ed. Omega.

*Tomas, C.R. (ed), (1997). Identifying Marine Phytoplankton. Academic Press.

*Van Den Hoek, C., (1995). Algae. An introduction to phycology. Cambridge University Press, Cambridge.

*Library

**Internet



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:

1. On-campus class: the theoretical contents of the subject will be taught during online sessions. Presentations will be carried out virtually during these sessions.
2. Laboratory practices: they will be carried out online. The programmed algal species will be studied by means of photographic or audiovisual material. We perform technical sheets for each one and it will be used as study material for the practical exam, as well as for the elaboration of a virtual algarium. The presencial session will be voluntary next course.
3. Calpe sessions and boat trip: the theoretical content of these sessions will be taught in a session called "introduction to field techniques". The presencial session will be voluntary next course.



4. The works to be delivered are adapted to the online format.

a) Final work UD 5 and 6 (10%): will be exposed in online sessions

b) Virtual algarium / practice report (15%): the algarium will be virtual and in a group. A single virtual algarium will be performed and each student will search information about the assigned algal species. It will be available for future students and it could be completed along time. This joint virtual algarium will act as practices report and will be useful for the study of practical exam.

c) Expositions DU 2, 3 and 4 (10%): will be exposed in online sessions



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: