Marine Biology

Code: 100830
ECTS Credits: 6

2025/2026

Degree	Type	Year
Environmental Biology	OB	3

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Teaching groups languages

You can view this information at the end of this document.

Prerequisites

There are no specific prerequisites, although it would be desirable for the students to have already studied and passed subjects in Zoology, Ecology, Propection of the Natural Environment, Extension of Zoology and Botany.

Objectives and Contextualisation

The objective of this course is to provide a basic training in the knowledge of the marine environment from the point of view of basic concepts and physical laws that are used in the study of the oceans, as well as living beings and their interrelationships. Introduce the student in the knowledge of the structure of the marine ecosystem and its biodiversity, and in the study of the most remarkable cases of the interaction of the activity of the man on the marine environment. So that they are able to intuit its consequences.

The specific formative objectives of this subject are:

- Give the student some fundamentals of the main physical and chemical processes that take place in marine aquatic ecosystems.

- Introduce the student to the physical bases or principles that are used to describe the dynamics of aquatic systems.

- Provide basic training in the knowledge of the marine environment from the point of view of living beings and their interrelationships.

- To initiate the student in the structure of the marine ecosystem and in its biodiversity.

- Introduce the student in the processing of energy in the marine environment, both at the individual and ecosystem level.

- To offer to the student the most remarkable cases of the interaction of the activity of the man on the marine environment and that are able to intuit its consequences.

- Develop critical and innovative sense, as well as interest in continuing professional development.

Competences

- Act with ethical responsibility and respect for fundamental rights and duties, diversity and democratic values.
- Diagnose and solve environmental problems regarding the biological environment.
- Identify and interpret the diversity of species in the environment.
- Manage information
- Participate in environmental impact assessments regarding the biological medium.
- Sample, characterise and manipulate populations and communities.
- Take account of social, economic and environmental impacts when operating within one's own area of knowledge.
- Take sex- or gender-based inequalities into consideration when operating within one's own area of knowledge.

Learning Outcomes

1. Act with ethical responsibility and respect for fundamental rights and duties, diversity and democratic values.
2. Actuar en l'àmbit de coneixement propi avaluant les desigualtats per raó de sexe/gènere.
3. Identify impacts on the flora, fauna, soils, vegetation and the functioning of the ecosystems.
4. Manage information
5. Perform inventories of organisms, sample populations and identify communities.
6. Propose measures to correct impacts on the flora, fauna, soils, vegetation and the functioning of the ecosystems.
7. Recognise in the field the principal plants, animals and organisms that are characteristic to the communities in our environment.
8. Take account of social, economic and environmental impacts when operating within one's own area of knowledge.

Content

SYLLABUS

1. Introduction. What is Marine Biology? Historical perspective of marine biology. Differences for life between terrestrial and marine environments. Classification of marine environments and organisms.
2. Seawater: chemical factors. Composition of seawater. Major and minor chemical elements. Nutrients. Dissolved gases (O_2, CO_2). Particulate and dissolved organic matter (POM and DOM). Sediments. Types of sediments. Sedimentation on the continental shelf and in deep-sea basins.

3. Physical factors of seawater. Salinity, temperature (thermoclines), density, viscosity, light. Vertical structure of the ocean: water masses, T/S diagrams. Orography. Structure of ocean basin margins and ocean floors (zonation and profiles).
4. Water mass dynamics. The atmosphere and the ocean. The Coriolis force. Geostrophic currents. Wind-driven currents: Ekman spiral, convergence and divergence zones. Thermohaline circulation. Global circulation: surface currents, deep currents, circulation in the Mediterranean. Ocean waves: capillary, gravitational, wave interference, internal waves, seismic waves. Tides. Coastal upwelling.
5. Marine communities: pelagic domain I. Plankton. General concepts. Plankton classification. Phytoplankton: composition and distribution. Primary production. Factors controlling and influencing primary production. Variations in global productivity: latitudinal, seasonal, regional, and bathymetric. Methods for measuring primary production and plankton.
6. Pelagic domain II. Zooplankton: general concepts. Composition of zooplankton. Adaptations of plankton to pelagic life. Zooplankton distribution: vertical migrations.
7. Pelagic domain III. Nekton: general concepts. Composition. Adaptations to pelagic life. Distribution of nekton: horizontal migrations. Sampling and study methodology.
8. Marine communities: benthic domain I. General concepts, benthic habitats, types of benthos. Comparison between benthos and plankton. Composition and distribution (rocky and sandy substrates, coastal and deep). *Posidonia oceanica* community. Adaptations of benthic animals. Spatial organization: succession. Sampling methodology.
9. Benthic domain II. Estuaries and coral reefs. Origin and types of estuaries. Physico-chemical characteristics of estuaries. Estuaries as ecosystems. Human impact on estuaries. Coral reefs: reef-building organisms (corals and others). Types of coral reefs (fringing, barrier, atolls). Coral reef ecology. Threats to coral reefs.
10. Biotic interactions. Introduction. Competition and coexistence. Predation in benthic and planktonic systems, anti-predation strategies. Symbiosis in the sea: parasitism, mutualism, and commensalism.
11. Energy transfer. Trophic webs. Introduction. Food chains and energy transfer. Estimation of secondary production. Trophic webs. The microbial loop. Comparison between marine and terrestrial production.
12. Human impact. Types of uses of the sea. Industrial and agricultural installations and activities. Exploitation of abiotic and biotic resources.
13. Protection and conservation. Protection tools. Threats and endangered species. Conservation and management of the coastal zone.

PRACTICAL CLASSES

- Practical 1. In two different beaches, collection of biological samples and measurement of abiotic parameters in the coastal zone. Labeling and preservation.
- Practical 2. (carried out in 3 sessions of 2-4 hours) Sample processing. Sample separation, analysis, identification, data collection. Data analysis. Preparation of a written report.
- Practical3. Discussion of practical results.
- Practical 4. Correction of the scientific article.

Activities and Methodology

Title	Hours	ECTS	Learning Outcomes
Type: Directed			
Classroom lectures	1	0.04	8, 4, 3, 6
Field practices	12	0.48	1, 4, 5, 7
Lab practices	14	0.56	4, 5
Seminar	4	0.16	8, 4, 3, 6

Theory lessons	20	0.8	8, 3, 6, 5
Type: Supervised			
Tutorial meeting	6	0.24	3, 6
Type: Autonomous			
Autonomous study and self-study work	54	2.16	4, 3, 6
Preparation of work, resolution of issues and problems	37	1.48	2, 4, 3, 6

The methodology used in this course to achieve the learning process is based on student work with available information. The function of the professor is to give the information or indicate where student can get it, helping and supervising the student during the learning process. To achieve this goal, the course is based on the following activities:

Lectures

The content of the theory program will be taught mainly by the teacher in the form of master classes with complementary interactive activities in which the student has a active role. The theory classes will be complemented with the visualization of animations and videos related to the topics covered in class. Likewise, some classes will be complemented with activities for evaluating student learning, by solving issues raised by the teacher that will be solved at the beginning of the session (when they serve as a review of contents already discussed in previous sessions) or at the end of the session (when questions help the reflection on the matter explained or the video analysed). The resolution of these issues will be evaluated individually or in groups. The visual aids used in class by the teacher will be available in the Virtual Campus. It is recommended that students take this material to class, to use it as support when taking notes. Students are advised to consult regularly the books recommended in the Bibliography section to consolidate and clarify, if necessary, the contents explained in class.

In these sessions the student acquires the basic scientific-technical knowledge of the course that must be complemented with personal study of the topics explained.

Seminars

They will consist of directed work classes, where current topics previously programmed by the teacher will be discussed in groups. The participation of students will be valued.

The aim of the seminars is to promotethe capacity for analysis and synthesis and critical reasoning.

Field and laboratory practices

Field practice consists of two trips (8 and 4hours respectively) to two beaches on the Catalan coast.

The laboratory practices consist of:

- 3 sessions of 4 hours for sample processing and obtaining results.

- 2 sessions of 2h aimed at the orientation of the treatment of results and discussion of results.

- 1 session of 2h aimed at the correction of the scientific article.

The students, based on the data collected in the field and the results obtained in the laboratory, will make a scientific mini-article with a maximum length of 15 pages (all included), with an Arial letter body of 12 with a line spacing of 1, 5, which will consist of the following mandatory sections:

- Title, authors, subject, course.

- Summary.

- Introduction to the topic of work with the objectives of the same at the end.

- Material and methods.

- Results

- Discussion.

- Bibliography (regulations in the Virtual Campus).

Once delivered and corrected the article by the teacher, a correction session will be made.

Tutorials

The aim of these sessions is to solve doubts, review basic concepts not explained in class and guide about the sources consulted by students. The schedule of the tutorials is specified with the teaching staff, and if the teacher considers it convenient, some can be done as a group in the classroom.

Annotation: Within the schedule set by the centre or degree programme, 15 minutes of one class will be reserved for students to evaluate their lecturers and their courses or modules through questionnaires.

Assessment

Continous Assessment Activities

Title	Weighting	Hours	ECTS	Learning Outcomes
Active participation in classes and seminar. Evaluation of deliveries of the related exercises.	10%	0	0	2, 8, 3, 6
Assistance and use of field and laboratory practices	10%	0	0	1, 7
Correction and delivery of the practice article	30%	0	0	4, 5, 7
Fisrt partial theory	17,5%	1	0.04	4, 3, 6
Second partial theory	32,5%	1	0.04	4, 3, 6

The evaluation of this subject is carried out throughout the course:

Evaluation of the attitude and participation of the student to master classes and seminars:

The attitude and participation (group and individual) in the different types of activities that will be developed throughout the theoretical classes and the seminar will be evaluated.

This evaluation has a global weight of 10% of the final grade and is not recoverable.

Evaluation of the exams:

Midterm exams:

With the midterm ones, the knowledge acquired by the student in the subject will be evaluated individually, as well as his capacity of analysis and synthesis, and of critical reasoning.

There will be 2 midterm exams of the subject:

The 1st midterm has a global weight of 32.5% of the final grade.

The 2nd midterm has a global weight of 17.5% of the final grade.

Recovery exam:

Students who do not pass any of the 2 midterm exams (minimum grade: 5 out of 10) must recover them in the final exam of recovery. The maximum note of the recovery will be a 6.

Students who wish to improve a grade of one or both of the midterms may do so by taking the final (recovery) exam, but the previously obtained grade will be lost.

To make the average with the other evaluative activities it is necessary to arrive at a 4.

Evaluation of the practices:

Of the assistance and use to the practices of field and laboratory (10%) and of the elaboration of a scientific article (30 %%) will result 40% of the final grade.

Written work will be evaluated:

- Introduction: conceptual clarity of the approach.

- Correction of the methodology

- Clear and concise presentation of the results.

- Ability to discuss and interpret the results.

- Formal quality of the document (tables, figures, references).

- Adaptation to theestablished length.

To make the average with the other evaluative activities it is necessary to arrive at 4.

This test (Practices) is not recoverable.

Not evaluable:

To be eligible for the retake process, the student should have been previously evaluated in a set of activities equaling at least two thirds of the final score of the course or module. Thus, the student will be graded as "No Avaluable" if the weight of all conducted evaluation activities is less than 67% of the final score. Attendance to practical sessions (or field trips) is mandatory. Students missing more than 20% of programmed sessionswill be graded as "No Avaluable"

SINGLE ASSESSMENT:

The single assessment consists of a single summary test in which the contents of the entire theory program of the subject will be assessed. The single assessment test will coincide with the same date fixed in the calendar for the last continuous assessment test and the same recovery system will be applied as for the continuous assessment.

Students who take the single assessment must do the field and laboratory practices in face-to-face sessions and it is a requirement to have them approved. Attendance at the sessions related to the practices paper, the seminars and the classroom practices will also be compulsory.

The assessment of PAUL, PLAB, PCAM and SEM will follow the same procedure as the continuous assessment.

Bibliography

Alcaraz, M., Estrada, M., Flos, J., Font, J., Romero, J. y Salat, J. 1985. L'oceanografia. I. Introducció a l'ecologia marina mediterrània. Diputació de Barcelona, Barcelona.
Cognetti, G., Sarà, M. y Magazzù, G. 2001. Biología Marina. Ariel Ciencia, Barcelona.
Demestre, M., Lleonart, J., Martin, P., Peitx, J.A. y Sardà, F. 1986. L'Oceanografia. II. Recursos pesquers de la mar catalana. Diputació de Barcelona, Barcelona.
Kaiser M. J. et al. 2020. Marine Ecology. Processes, Systems and impacts. Oxford University Press, Oxford.
Lalli, C.M. y Parsons, T.R. 2006. Biological oceanography. An introduction. Pergamon Press, Oxford.
Levinton, J.S. 2017. Marine Biology, function, biodiversity, ecology. Oxford University Press, New York.
Pinet, P.R. 2021. Invitation to Oceanography. Jones and Bartlett Publishers, Sudbury.

WEB pages

http://www.icm.csic.es WEB del Instituto de Ciencias del Mar de Barcelona (CSIC), con información sobre investigación en temas marinos, divulgación y noticias que se actualizan periódicamente.

http://www.jbpub.com/oceanlink Material que complementa la información del libro de texto Pinet (2000).

http://seawifs.gsfc.nasa.gov/OCEAN_PLANET/HTML/peril_habitat.html Informaciones sobre impactos actuales del hombre en el mar.

http://www.noaa.gov Publicación de la NOAA (National Oceanographic & Atmospheric Administration, Departament of Commerce, U.S.) sobre los océanos, pesquerías, clima, costas, etc.

http://www.mispeces.com/boletin Información (noticias, agenda, legislación y novedades) sobre Pesquerías y Acuicultura en España y Europa.

www.ceab.csic.es

www.ieo.es

www.coml.org Census of Marine Life. De todo. Muchos links

www.scarmarbin.be: SCAR Scientific Committee on Antarctic Research

www.obs-banyuls.fr Banyuls Sur Mer Fr.

Software

RStudio

Deducer

Ocean Data View (*ODV*)

QGIS

Groups and Languages

Please note that this information is provisional until 30 November 2025. You can check it through this link. To consult the language you will need to enter the CODE of the subject.

Name	Group	Language	Semester	Turn
(PAUL) Classroom practices	231	Catalan	first semester	morning-mixed
(PAUL) Classroom practices	232	Catalan	first semester	morning-mixed
(PCAM) Field practices	231	Catalan	first semester	morning-mixed
(PCAM) Field practices	232	Catalan	first semester	morning-mixed
(PCAM) Field practices	233	Catalan	first semester	morning-mixed
(PLAB) Practical laboratories	231	Catalan	first semester	afternoon
(PLAB) Practical laboratories	232	Catalan	first semester	afternoon
(PLAB) Practical laboratories	233	Catalan	first semester	afternoon
(SEM) Seminars	231	Catalan	first semester	afternoon
(SEM) Seminars	232	Catalan	first semester	afternoon
(SEM) Seminars	233	Catalan	first semester	afternoon
(TE) Theory	23	Catalan	first semester	morning-mixed