UAB
Universitat Autònoma de Barcelona

Marine Science

Code: 106769
ECTS Credits: 6

2024/2025

Degree	Type	Year
2504604 Environmental Sciences	OB	2

Contact

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Teachers

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Teaching groups languages

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

Prerequisites

There are no specific prerequisites.

Objectives and Contextualisation

The objective of this subject is to provide a base training in the knowledge of the marine environment, which encompasses aspects of physics, chemistry and geology, as well as the field of living organisms and their interrelations. The aim for the student is to have an overview of the structure of the marine ecosystem and its biodiversity, introducing the students into the study of the most remarkable cases of the interaction of man's activity on the marine environment, and to be able to understand its consequences.

Learning Outcomes

1. CM36 (Competence) Incorporate the use of environmental tracers or basic analytical techniques into the characterisation of specific processes of hydrology, oceanography, or pollutant dispersion.
2. CM39 (Competence) Transmit general scientific information associated with an environmental problem to a general audience appropriately.
3. KM46 (Knowledge) Identify the most important chemical and geological processes in the different environmental compartments (hydrosphere, soil and atmosphere).

4. KM47 (Knowledge) Recognise the way in which human activity has an impact on the function of physical vectors (water, soil, oceans, atmosphere) in the natural environment.
5. KM48 (Knowledge) Compare the basic principles of science (hydrology, marine sciences, climatology, soil sciences, etc.) that constitute the basis for the study of the Earth system from an environmental perspective.
6. KM49 (Knowledge) Recognise the techniques and tools for sampling, analysis and environmental tracers.
7. SM44 (Skill) Characterise the main consequences of pollution in the natural environment and associated transport mechanisms.
8. SM45 (Skill) Apply basic mathematical tools and models to describe the dynamics of environmental processes.
9. SM46 (Skill) Characterise the main processes of natural environments (marine, soil, atmosphere), including aspects of physics, chemistry, geology, biology and their interaction.
10. SM47 (Skill) Analyse changes in the physical environment caused by natural or anthropogenic action based on the data available.
11. SM48 (Skill) Apply the main stages of the analytical procedure, including the collection and analysis of samples, for the study of the physical environment.

Content

Classes of theory and problems

1) Introduction: Oceanography, an integrating discipline. Physical, geological, chemical and biological oceanography. The ocean as a global system. Dimensions, measured variables and processes involved.

2) Chemical oceanography. Chemical composition of the oceans and the nature of the physical, chemical and biological processes that govern this composition in the past and the present. The cycles of the oceanic components majors and minors, with special attention to those that are more important for the life (i.e., carbon, nitrogen, phosphorus, silicon and oxygen). The research of primary production, production for exportation, remineralisation, diagenesis, air-sea gas exchange processes.

3) Physical oceanography. The atmospheric influence and the energy balance in the ocean. The equations of the movement: The forces that intervene in the movement of the ocean. Conservation of the mass: continuity equation. Preservation of the moment: Navier-Stokes equations. The influence of viscosity.

4) Geological oceanography. Continental margins and ocean basins. Sediments at the seabed and its importance in biogeochemical cycles. Trace elements and isotopes. Use of sediments as records of climate, paleo-circulation and pollution.

5) Relationships between ocean circulation and smaller scale movements, climate, atmosphere and biogeochemical transport.

6) Applied oceanography. Measurement and instrumentation methods. Oceanographic ships and satellites: Exploring the resources in the ocean.

7) Biological oceanography. Classification of the marine environments and organisms.

8) Marine communities: pelagic domain. Primary production and phytoplankton. Zooplankton and necton. Adaptations to pelagic life. Horizontal and vertical migrations

9) Marine communities: benthic domain. Generalities Composition and distribution. Supralitoral, mediolitoral, infralitoral, circalitoral (coral) in rocky and sandy seabeds. The Posidonia oceanica community.

10) Marine communities: Deep-sea. Batial, abyssal and hadal domains. Composition and adaptations.

11) Feeding and reproduction strategies at sea.

12) Biotic interactions. Competence and coexistence. Predation in benthos and plankton

13) The transfer of energy. Trophic networks.

14) The impact of man. Industrial and agricultural facilities and activities. Exploitation of their abiotic and biotic resources.

Practical part:

Practice 1 (field).- Collection of biological samples and measurement of abiotic parameters of a coastal zone. Labeling and conservation.

Practice 2 (laboratory).- Processing of samples. Separation of samples, analysis, identification, data collection. Results treatment.

Practice 3.- Elaboration of a practical work type scientific article or technical report.

Activities and Methodology

Title	Hours	ECTS	Learning Outcomes
Type: Directed			
Field practice	4	0.16	KM49, SM44, SM45, SM46, SM47, SM48
Laboratory practice	6	0.24	CM36, SM44, SM45, SM46, SM47, SM48
Master classes	34	1.36	CM36, KM46, KM47, KM48, KM49
Practical examples (solving problem classes)	4	0.16	CM36, KM46, KM47, KM48, SM45, SM46, SM47
Type: Supervised			
Tutorials	2	0.08	CM39
Type: Autonomous			
Preparation of work, resolution of cases	40	1.6	KM46, KM47, KM48, KM49, SM47
Self study and self-study work	53	2.12	KM46, KM47, KM48, KM49, SM47

Master Classes
The content of the theory program will be taught by the teacher mainly in the form of master classes. The theoretical classes will be complemented with the visualization of animations and videos related to the subjects treated in class. The material used in class by the teacher will be available on the Virtual Platform. It is recommended that students bring this material to class to use it as a support when taking notes. With these classes the student acquires the basic knowledge of the subject that must complement the personal study of the topics explained.

Practical examples (cases) (solving problem classes)
The master classes will be complemented with acivities of evaluation of the learning by means of the resolution of practical cases using the software Ocean Data View (ODV).

Either in the master or the solving problem classes, there will be some work that will consist of directed workclasses, where they will discuss in groups current topics previously programmed by the teacher. Later, the subjects will be exposed by part of the students in group.

Field and laboratory practices:
The practice of field will consist of the exit to a beach of the Catalan coast for the collection of biological samples and measure of abiotic parameters of the coastal zone.

The laboratory practice will be used for the processing of samples: separation of samples, analysis, identification, data collection. Finally, the treatment of results will be carried out.

The students, based on the data collected in the field and the results obtained in the laboratory, will carry out a practical report that will have a small scientific article structure. The work will be done in the group of 4-5 people who have worked during the practice on the beach and at the laboratory.

Tutorials
The purpose of these sessions is to solvedoubts, to review basic concepts not explained in class and to guide the sources consulted by students. The hours of individualized tutorials will be specified with the teacher.

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
Case resolution	10	1	0.04	CM39, SM45, SM47, SM48
Midterm exam 1	30	1.5	0.06	CM36, KM46, KM47, KM48, KM49, SM44
Midterm exam 2	30	1.5	0.06	CM36, KM46, KM47, KM48, KM49, SM44
Practical issues	10	1	0.04	SM46, SM47, SM48
Work presentation	20	2	0.08	CM39, KM46, KM47, KM48, SM46

Exams:

Partial exams: With the partial ones the students' knowledge in the subject will be assessed individually, as well as their capacity for analysis and synthesis, and of critical reasoning.
There will be 2 obligatory partial exams, with a weight of 30% each one.

Evaluation of case solving:

Resolution of cases will be submitted during the course. The evaluation of the resolution of the cases raised in class will have a weight of 10% of the final mark. There will be no recorvey opportunity of this mark.

Presentation of targeted group work:

The assessment of the project will be done in relation to the oral presentation of all the members of each group. This activity represents 20% of the final grade. There will be no recorvey opportunity of this mark.

Assessment of practices:

Attendance and participation in laboratory and field practices, and the preparation of a scientific article will result in 10% of the final mark of the subject. Attendance is mandatory. There will be no recorvey opportunity of this mark.

Retrieval:

To pass the course, the average grade obtained must be equal to or higher than 5 (out of 10), and the grade for each of the midterm exams must be equal to or higher than 4 (out of 10). To be evaluated, attendance at the field trip and submission of the group works are required.

Those students that do not get the minimum grade to pass the course have the option of a retrieval exam, repeating one or the two midterm exams.

Not evaluable:

Students who have been evaluated in less than 25% of the assessable activities will receive a final grade of NOT ASSESSABLE

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 oral defence session of the targeted group work will also be compulsory.

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

Bibliography

Physical oceanography:

J.R.Apel Principles of ocean physics Academic Press, 1988

G. Beraman (ed.) Open University, Ocean circulation Pergamon Press1995

M.Grant Gross, E. Gross, Oceanography Prentice Hall 1996

J.A. Knauss, Introduction to Physical Oceanography, Prentice Hall 1997

S. Pond and G.C.Pickard, Introductory dynamical oceanography, Butterworth, 1997

At http://www.cmima.csic.es/mirror/mattom/IntroOc/index.html you can find the text of Robert Stewart "Introduction to Physical Oceanography", which contains a material that is very suitable for the objectives and contents of the physical part of this subject.

Biological oceanography:

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.

Lalli, C.M. y Parsons, T.R. 1997. Biological oceanography. An introduction. Pergamon Press, Oxford.

Levinton, J.S. 2001. Marine Biology, function, biodiversity, ecology. Oxford University Press, New York.

Pillay, T.V.R. 1992. Aquaculture and the Environment. John Wiley & Sons, New York.

Pinet, P.R. 2000. Invitation to Oceanography. Jones and Bartlett Publishers, Sudbury.

Valiela, I. 1995. Marine ecological processes. Springer Verlag, New York.

WEB Pages

http://grupsderecerca.uab.cat/biologiamarina/ca Bridging the gap: Apropant la recerca en biologia marina.

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://www.enn.com Noticias de investigaciones medioambientales.

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.

http://www.aquaflow.org Proyecto de la Comisión Europea para la diseminación de la información de I+D en acuicultura.

Virtual teaching has highlighted the importance of being able to have online resources. During these months, publishers have opened up a lot of content, and the digital book-proof platform is also available (50,000 accessible books - https://mirades.uab.cat/ebs/).

In this link, you will find an infographic prepared by the Library Service to facilitate the location of electronic books: https://ddd.uab.cat/record/2249299

http://www.uab.cat/doc/BibliografiaCursDigital

Software

Apart from the basic software, the rest will be free software, such as the R program or the Ocean Data View (https://odv.awi.de/). You will not be required to purchase any licensed software.

Language list

Name	Group	Language	Semester	Turn
(PAUL) Classroom practices	1	Catalan	second semester	morning-mixed
(PAUL) Classroom practices	2	Catalan	second semester	morning-mixed
(PCAM) Field practices	1	Catalan	second semester	morning-mixed
(PCAM) Field practices	2	Catalan	second semester	morning-mixed
(PCAM) Field practices	3	Catalan	second semester	morning-mixed
(PCAM) Field practices	4	Catalan	second semester	morning-mixed
(PLAB) Practical laboratories	1	Catalan	second semester	afternoon
(PLAB) Practical laboratories	2	Catalan	second semester	afternoon
(PLAB) Practical laboratories	3	Catalan	second semester	afternoon
(PLAB) Practical laboratories	4	Catalan	second semester	afternoon
(TE) Theory	1	Catalan	second semester	morning-mixed