Universitat Autònoma de Barcelona

2023/2024

Marine Science

Code: 106769
ECTS Credits: 6

Degree	Type	Year	Semester
2504604 Environmental Sciences	OB	2	2

Contact

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Teaching groups languages

You can check it through this link. To consult the language you will need to enter the CODE of the subject.
Please note that this information is provisional until 30 November 2023.

Teachers

Valenti Rodellas Vila

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. The approach attempts to achieve a compromise between formal analysis and phenomenological vision.

Learning Outcomes

- CM38 (Competence) Distinguish the most appropriate mathematical tools and models to describe the dynamics of specific environmental processes.
- CM39 (Competence) Transmit general scientific information associated with an environmental problem to a general audience appropriately.
- KM46 (Knowledge) Identify the most important chemical and geological processes in the different environmental compartments (hydrosphere, soil and atmosphere).

- 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.
- 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.
- SM46 (Skill) Characterise the main processes of natural environments (marine, soil, atmosphere), including aspects of physics, chemistry, geology, biology and their interaction.

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.

Seminars:

Topics previously programmed by the teacher and presented by the students in a groups.

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.

Methodology

The methodology used in this subject to achieve the learning process is based on making the student work the information that is put to his/her reach. The function of the teacher is to give the student the information or tell him/her where he can get it and help within the process, so that the learning process can be carried out effectively. To achieve this goal, the subject is based on the following activities:

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. Also, some classes will be complemented with assessment activities of the student's learning, by solving questions raised by the teacher that will be resolved well at the beginning of the session (when they can be used to review contents already exposed in previous sessions), or at the end of it as questions of reflection on the matter explained or the video analyzed. The material used in class by the teacher will be available on the Virtual Platform. It is recommended that students print this material and take it to class, to use it as a support when taking notes. It is recommended that students regularly consult the books recommended in the Bibliography section in order to consolidate and clarify, if necessary, the contents explained in class. 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. Thus, the student will learn to properly measure and represent the processes, physical, chemical and biological laws that apply to oceanography.

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. The participation of the students will be valued. Later, the subjects will be exposed by part of the students in group. The mission of the seminars is to promote the capacity for analysis and synthesis and critical reasoning.

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 that must contain at least the following sections:

- Title, authors, subject, course.
- Introduction to the subject of the work, with the objectives of the same in the end.

- Material and methods (do not copy the practice script).
- Results.

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 solve doubts, 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. Three tutorials will also be evaluated by a group of students, two to follow the work of the seminar and one to follow the practical work.

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.

Activities

Title	Hours	ECTS	Learning Outcomes
Type: Directed			
Field practice	4	0.16	SM46, SM46
Laboratory practice	6	0.24	SM46, SM46
Master classes	34	1.36	CM39, KM46, KM47, KM48, SM46, CM39
Practical examples (solving problem classes)	4	0.16	CM38, CM39, KM46, KM47, KM48, SM46, CM38
Practical issues (cases)	4	0.16	CM38, KM47, KM48, SM46, CM38
Type: Supervised			
Tutorials	2	0.08	KM48, KM48
Type: Autonomous			
Preparation of work, resolution of cases	40	1.6	KM46, KM47, KM48, SM46, KM46
Self study and self-study work	47	1.88	KM46, KM47, KM48, KM46

Assessment

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

Assessment of the attitude and participation of the student to lectures, seminars and cases:
Attitude and participation (group and individual) will be evaluated in the different types of activities that will be developed throughout the theoretical classes and the seminar. This evaluation has a global weight of 5% of the final grade.

Evaluation of the 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.

Final exam: Students who do not pass one of the 2 partial exams (minimum grade: 5 out of 10) will have to recover them to the final exam. Likewise, students who wish to improve the grade of one or both of the parts can do so by presenting themselves to the final exam, but the previously obtained note will be lost.
To make the average with the other activities evaluated it is necessary to reach a minimum grade of 4.

To ask for a reevaluation the student must have been received a mark in activities that represent at least 2/3 of the global mark during the course.

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 work (developed in supervised theory or solving problem classes) will be done in relation to the oral presentation of all the members of each group. This activity represents 25% of the final grade. Therewill 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. The written work will be assessed:
- Conceptual clarity of the approach.
-Addiction of the methodology.
- Clear and concise outcome of the results.
-Capacity for discussion and interpretation of results
- Formal quality of the document (tables, figures, references).

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.

Assessment Activities

Title	Weighting	Hours	ECTS	Learning Outcomes
Assistance and participation in practices and cases	5	2	0.08	KM46, KM47, KM48, SM46
Case resolution	10	1	0.04	CM38, KM46, KM48, SM46
Oral presentation	25	2	0.08	CM39, KM46, KM47, KM48
Partial examination 1 (individual assessment)	25	1.5	0.06	KM46, KM47, KM48

Partial examination 2 (individual assessment)	25	1.5	0.06	KM46, KM47, KM48, SM46
Practical issues	10	1	0.04	KM47, KM48, SM46

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/224929

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.