Oceanography

Code: 102824
ECTS Credits: 6

2024/2025

Degree	Type	Year
2501915 Environmental Sciences	OT	4

Contact

Name: Anna Soler Membrives

Email: anna.soler@uab.cat

Teachers

Ester Carreras Colom

Valenti Rodellas Vila

Teaching groups languages

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

Prerequisites

There are no specific prerequisites, although it would be highly recommended that students have already passed and passed the subject of Zoology.

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.

Competences

- Adequately convey information verbally, written and graphic, including the use of new communication and information technologies.
- Analyze and use information critically.
- Collect, analyze and represent data and observations, both qualitative and quantitative, using secure adequate classroom, field and laboratory techniques

- Demonstrate adequate knowledge and use the most relevant environmental tools and concepts of biology, geology, chemistry, physics and chemical engineering.
- Demonstrate adequate knowledge and use the tools and concepts of the most relevant social science environment.
- Demonstrate concern for quality and praxis.
- Demonstrate initiative and adapt to new situations and problems.
- Information from texts written in foreign languages.
- Integrate environmental information in order to formulate and test hypotheses.
- Integrate physical, technological and social aspects that characterize environmental problems.
- Learn and apply in practice the knowledge acquired and to solve problems.
- Quickly apply the knowledge and skills in the various fields involved in environmental issues, providing innovative proposals.
- Teaming developing personal values regarding social skills and teamwork.
- Work autonomously

Learning Outcomes

1. Adequately convey information verbally, written and graphic, including the use of new communication and information technologies.
2. Analyze and use information critically.
3. Demonstrate concern for quality and praxis.
4. Demonstrate initiative and adapt to new situations and problems.
5. Demonstrate knowledge of some of the main areas of scientific disciplines environment.
6. Demonstrate knowledge of some of the main areas of the social sciences in the environment.
7. Identify processes sciences, life sciences and social sciences in the surrounding environment and evaluate them properly and originally.
8. Information from texts written in foreign languages.
9. Integrate environmental information with environmental knowledge acquired from the sequence of observation, recognition, synthesis and modeling.
10. Learn and apply in practice the knowledge acquired and to solve problems.
11. Learn the main physical and biological bases of oceanography and their interactions.
12. Observe, recognize, analyze, measure and properly and safely represent environmental processes.
13. Teaming developing personal values regarding social skills and teamwork.
14. Work autonomously

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.

Activities and Methodology

Title	Hours	ECTS	Learning Outcomes
Type: Directed			
Field practice	4	0.16	4, 5, 7, 9, 11, 12, 13, 14
Laboratory practice	6	0.24	1, 2, 3, 5, 7, 9, 10, 11, 12, 13, 14
Magistral sessions	32	1.28	5, 7, 9, 11, 12
Problems	4	0.16	3, 7, 9, 10, 11, 12, 14
Seminars	4	0.16	1, 2, 3, 5, 7, 8, 9, 12, 13
Type: Supervised			

Tutorials	2	0.08	1, 3, 4, 5, 9, 11, 13
Type: Autonomous			
Preparation of work, resolution of questions and problems	40	1.6	1, 2, 3, 5, 9, 10, 11, 12
Self study and self-study work	50	2	2, 5, 7, 11, 14

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.

Problems
The master classes will be complemented with activities of evaluation of the learning by means of the resolution of problems. Thus, the student will learn to properly measure and represent the processes, physical, chemical and biological laws that apply to oceanography.

Seminars
Seminars will consist of directed work classes, 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.

Assessment

Continous Assessment Activities

Title	Weighting	Hours	ECTS	Learning Outcomes
Assistance and participation in seminars, practices and problems	5%	2	0.08	2, 3, 4, 5, 11, 13
Correction and delivery of practical articles	10%	1	0.04	1, 2, 3, 5, 8, 9, 10, 11, 12, 13
Oral presentation	25%	2	0.08	1, 2, 3, 5, 7, 8, 9, 11, 13
Partial examination 1 (individual assessment)	25%	1.5	0.06	1, 5, 6, 11
Partial examination 2 (individual assessment)	25%	1.5	0.06	1, 5, 6, 11
Problem solving	10%	0	0	1, 5, 10, 11, 12, 14

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 problems:
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 problem solving:

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

Seminars for the presentation of targeted group work:

The assessment of the work 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 seminars 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	first semester	morning-mixed
(PCAM) Field practices	1	Catalan	first semester	morning-mixed
(PCAM) Field practices	2	Catalan	first semester	morning-mixed
(PLAB) Practical laboratories	1	Catalan	first semester	afternoon
(SEM) Seminars	1	Catalan	first semester	morning-mixed
(TE) Theory	1	Catalan	first semester	morning-mixed