Ocean Biological Processes (250572)

General Information

School	ETSECCPB
Departments	Departament d'Enginyeria Agroalimentària i Biotecnologia (DEAB)
Credits	6.0 ECTS
Programs	GRAU EN CIÈNCIES I TECNOLOGIES DEL MAR (pla 2018)
Course	2024/25

Main teaching language at each group

- Group 10ES1 Spanish (Q1)

Faculty

Responsible Faculty: Marta Balsells Fernàndez-pedrera
Faculty: Sara Balbuena Pecino, Marta Balsells Fernàndez-pedrera

Objectives of Education

This subject addresses aspects that allow to know the connection that exists between physical-chemical and biological processes in the ocean by analyzing the changes in spatial and temporal patterns of the flow of matter and energy in the pelagic communities, its relation to the physicochemical dynamics of water masses, the processes that govern primary and secondary oceanic production. The complexity and heterogeneity of the marine nekton and its relationship with the habitat are also studied. Fish communities from different oceanic environments, their trophic relationships, migratory processes and the state of conservation of fish and marine mammals are also analyzed.

1.- Understand and analyze the connection that exists in the ocean between physicochemical and biological processes.
2.- Analysis of changes in spatial and temporal patterns, as well as the flow of matter and energy, in the pelagic communities that populate the oceans, in relation to the physical-chemical dynamics of the ocean.
3.- Understand the processes that govern the primary and secondary oceanic production and their impacts both in the water column and in the atmosphere, as well as in the food chain.

This subject is oriented to a high-level interdisciplinary training, by addressing in depth all the major areas of the Marine Sciences (Physical, Geological, Chemical and Biological Oceanography), as well as providing a solid foundation in programming and problem solving methods through the use of computer calculation programs that allow a comprehensive understanding of the marine environment, its problems and the possible solutions to them.

Competencies

Especific

To know and apply the lexicon and concepts of the Marine Sciences and Technologies and other related fields.
Evaluate the bio- and geo-diversity of the marine environment, identifying habitats and ecosystems with multidisciplinary criteria.
Address the most relevant processes and their interactions related to their physical / chemical / biological / geological components, applying technical and scientific knowledge and criteria.
To set, evaluate and propose solutions to the different conflicts of use and exploitation in the marine and coastal environment resources based on scientific and technical criteria.

To set, analyze and optimize the functionality of actions and infrastructures in the marine environment. (Specific competence of the Marine Science and Engineering Mention)
Develop a conceptual framework to address the sustainability of the marine environment and the related socio-economic activities at different scales, explaining the effects of climate change.
Set, plan and execute basic and applied research in the field of Marine Sciences and Technologies.
Carry out calculations, assessments, surveys and inspections in coastal and marine environments, as well as the corresponding technical documents.
Write technical reports and disseminate knowledge about the different components of the marine system, considering the applicable legal framework.
Apply the necessary tools to analyze the economic and legal aspects of human actions and the related impacts on the marine environment, including technical advice and representation of companies and administrations.

Generic

Develop a professional activity in the field of Marine Sciences and Technologies.
Apply state-of-the-art methods and techniques in oceanography and marine climate, jointly covering the physical, chemical, geological and biological aspects.
Develop a conceptual framework that links the scientific-technological and management aspects for marine resources, explaining the interactions with marine infrastructures and management plans in coastal areas.
Apply knowledge and academic experience to the biotic and abiotic resources of the marine environment, explaining their interactions with the socio-economic activities that take place in it.
Encompass and teach studies in the different research lines that converge in Marine Sciences and Technologies.
Combining preservation with economic activity within the framework of current legislation promoting the development of a social and environmental awareness.

Total hours of student work

		Hours	Percentage
Supervised Learning	Large group	40.02 h	66.70 %
	Medium group	0.0 h	0.00 %
	Laboratory classes	19.98 h	33.30 %
	Guided Activities	0.0 h	0.00 %
Self Study		90.0 h	

Contents

Introduction to oceanic biological processes

Introduction to oceanic biological processes

Specific Objectives

to know the distribution of the different marine ecosystems, in addition to the distribution of the chemical elements and their abundance in relation to the biological processes, the cycles of matter and the trophic networks that they address in the marine environment, as well as some of the oceanographic research techniques .

Energy flows and interactions between processes

Energy fluxes and interaction proceses
Laboratory

Specific Objectives

The objective of this topic is to know the primary and secondary processes of the marine environment, as well as the snow and regenerated production existing in ocean ecosystems. The seasonality of primary

production and the adaptations of different organisms to environmental processes will also be studied.
In order to interpret the adaptations to pelagic life presented by the specimen, two different species will be observed in the laboratory, a pelagic fish with a typically benthic one, and these species will have to be drawn and compared. Biometric study of a specimen of a species of fish, to assess the state of a fishery resource, which allows estimating the age of first maturity, growth evaluations and being able to determine the size and age of the first allowable catch. It will also be necessary to know its stomach content to establish trophic networks in a body of water and to be able to estimate the function that a species fulfills considering its size and age.

DISSOLVED GAS, MO AND NUTRIENTS

Dissolved gases, OM and nutrients
Oceanic biological processes

Specific Objectives

know in detail the different cycles of nutrients existing in the marine environment, as well as their interaction in ecosystems and organisms, as well as the different gases dissolved in seawater and the production of organic matter
Approach to a research topic. Identification of relevant questions and methods to find answers by discussing scientific articles on the subject.

Export

Export

Specific Objectives

Know the biological pump and the different methodological aspects, as well as the spatio-temporal variability in export at sea. Attenuation of vertical flow and shallow and deep sedimentation occurred in the ocean. Coast-ocean differences

Marine habitats

Marine environments

Specific Objectives

The objective of this topic is to know the different habitats existing in the marine environment and their interaction with the rest of the oceanographic variables, as well as their characteristics and exceptionalities that allow a specific community in each of them.

INTERACTION PHYSICAL AND BIOLOGICAL PROCESSES

biological and physical processes interactions

Specific Objectives

The objective of this topic is to know the relationship between the physical processes of the marine environment and the biological processes that occur in the ocean, in order to establish the complex connections that organisms in this environment are subjected to.

Activities

Exposition

The student will have to work on a topic in group and present it in front of the class in order to practice both teamwork and oral presentation in front of an audience

Dedication

3h

Way out

There will be a field trip related to the theoretical concepts explained in the classroom.

Dedication

6h

Teaching Methodology

The course consists of 2.3 hours per week of classroom activity (large size group).

The 2.3 hours in the large size groups are devoted to theoretical lectures, in which the teacher presents the basic concepts and topics of the subject, shows examples and solves exercises.

The rest of weekly hours devoted to laboratory practice.

Support material in the form of a detailed teaching plan is provided using the virtual campus ATENEA: content, program of learning and assessment activities conducted and literature.

Although most of the sessions will be given in the language indicated, sessions supported by other occasional guest experts may be held in other languages.

To do the laboratory practices you need the following personal protective equipment (PPE):
* White lab coat UPC Chemical

Grading Rules

(*) The evaluation calendar and grading rules will be approved before the start of the course.

The mark of the course is obtained from the ratings of continuous assessment and their corresponding laboratories and/or classroom computers.

Continuous assessment consists of doing different activities, both individual and group, of an additive and formative nature, carried out during the course (inside and outside the classroom and the practicals). The continuous assessment grade is the weighted arithmetic average of the work/exhibition (Tr) carried out during the course, of the directed activities such as practical work or reports (Pr) and of the partial exams (Ex, which will have the same value).

The laboratory teaching grade (Pr) is the average of the activities of this type, and is worth 20% of the final grade.

Two mid-term exams will be taken and will count for 70% of the grade. These exams consist of questions on concepts associated with the learning objectives of the subject in terms of knowledge or understanding.

In addition, a group work with a subsequent presentation (Tr) is worth 10% of the course.

The final grade will be EO=0.7*(average of Ex1 and Ex2)+0.20*(average of Pr) +0.10*(average of Tr).

In order to pass the course, students must have attended at least 80% of the practicals.
To pass, the final mark (Ex+Tr+Pr) must be greater than or equal to 5.

Re-evaluation:

Qualification criteria and admission to re-evaluation (Re):

Students failed at the ordinary assessment who have regularly sat the assessment tests of the failed subject will have the option to take a re-evaluation test in the period set in the academic calendar. Students who have already passed the re-evaluation test of a subject and students who have not handed in all the exercises/problems (Pr) and the assignments and reports (Tr) will not be able to sit the re-evaluation test of

a subject.

The re-evaluation (RE) will consist of a single exam covering the whole course content. The maximum mark for the re-evaluation will be five (5.0) and the final mark for the course will be the maximum mark between the continuous assessment and the re-evaluation exam, i.e. MAX(EO/RE).

The non-attendance of a student summoned to the re-evaluation test, held in the fixed period, may not give rise to the taking of another test at a later date. Extraordinary assessments will be carried out for those students who, due to accredited force majeure, have not been able to take any of the continuous assessment tests. These tests must be authorised by the corresponding Head of Studies, at the request of the teacher responsible for the subject, and will be held within the corresponding teaching period.

Test Rules

Failure to perform a laboratory or continuous assessment activity in the scheduled period will result in a mark of zero in that activity. The tests will be taken individually, with multiple-choice questions.

Office Hours

The hours of attention will be on Fridays before and after classes. If not, you can contact the teacher in charge and specify a specific day.

Bibliography

Basic

- Lalli, C.M.; Parsons, T.R. Biological oceanography: an introduction. 2nd edition. Oxford [England]: Butterworth Heinemann, 1997. ISBN 9780750633840.
- Miller, C.B.; Wheeler, P.A. Biological oceanography. 2nd ed. Oxford: Wiley-Blackwell, 2012. ISBN 9781444333022.

Complementary

- Mann, K.H.; Lazier, J.R.N. Dynamics of marine ecosystems: biological-physical interactions in the oceans. 3rd edition. Malden [Mass.]: Blackwell, 2006. ISBN 1405111186.
- Paul G. Falkowski, Avril D. Woodhead. Primary Productivity and Biogeochemical Cycles in the Sea. Springer, 2013. ISBN 1489907645.

Resources

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You can buy them at UPC Shop (upc-shop.com) or any specialty store."