Universitat Autònoma de Barcelona

2018/2019

Marine Biology

Code: 100830
ECTS Credits: 6

Degree	Type	Year	Semester
2500251 Environmental Biology	OB	3	1

Contact

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Use of languages

Principal working language: spanish (spa)
Some groups entirely in English: No
Some groups entirely in Catalan: No
Some groups entirely in Spanish: No

Other comments on languages

The subject is taught in Catalan and Spanish

Teachers

Francesc Xavier Munill Bernardich

Anna Soler Membrives

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.

Skills

- Adopt an ethical stance.
- Develop a sensibility towards environmental issues.
- 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.

Learning outcomes

1. Adopt an ethical stance.
2. Develop a sensibility towards environmental issues.
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.

Content

INTRODUCTION

1. Introduction. What is Marine Biology? Historical perspective of marine biology. An oceanic world. Differences for life between the terrestrial and marine environment. Classification of marine organisms and environments.

II. THE MARINE ENVIRONMENT

2.- Sea water: chemical factors. Composition of sea water. Chemical elements present major and minor. Nutrients. Dissolved gases (O_2, CO_2). Particle and dissolved organic matter (MOP and MOD). Sediments. Type of sediment. Sedimentation on the continental shelf and in deep marine basins.

3.- Physical factors of the sea water. Salinity, temperature (thermocline), density, viscosity, light. Vertical structure of the ocean: masses of water, diagrams T / S. Orography. Structure of the margins of the ocean basins and the bottoms of the oceans (zoning and profiles).

4.- The dynamics of the water masses. The atmosphere and the ocean. The force of Coriolis. Geostrophic currents. Wind currents: Ekman's spiral, convergences and divergences. Thermohaline circulation. Global circulation: surface currents, deep currents, circulation in the Mediterranean. Marine waves: capillary, gravitational, wave interference, internal waves, seismic waves. The tides. Coastal upwelling.

III. MARINE ECOSYSTEM STRUCTURE: Marine communities

5.- Primary production to the sea. Primary production. Methods to measure primary production. Methods to measure phytoplankton biomass. Factors that control and condition primary production. Factors that control the percentage of nutrient salts in the Mediterranean. Variations in global productivity: latitudinal, seasonal, regional and bathymetric.

6.- Marine communities: pelagic domain I. Plankton. Generalities. Classification of plankton. Phytoplankton: composition and distribution. Methodology of sampling and study of plankton.

7.- Pelagic domain II. Zooplankton: generalities. Composition of zooplankton. Adaptations of plankton to pelagic life. Distribution of zooplankton: Vertical migrations. The plankton indicator.

8.- Pelagic domain III. Necton: Generalities. Composition. Adaptations to pelagic life. Distribution of the necton: horizontal migrations. Methodology of sampling and study. Current status of exploited stocks.

9.- Marine communities: benthic domain I. Generalities, benthic habitats, type of benthos. Comparison between benthos and plankton. Composition and distribution (rocky and sandy substrate, coastal and deep). The community of *Posidonia oceanica*. Adaptations of benthic animals. The organization of space: succession. Sampling methodology.

10.- Benthic domain II. Estuaries and coral reefs. Origin and type of estuaries. Physico-chemical characteristics of estuaries. Estuaries as ecosystems. Human impact on estuaries. Coral reefs: Bioconstructive organisms (corals and others). Types of coral reefs (coastal, barrier, atolls). Ecology of coral reefs. Threats to coral reefs.

IV. ENERGY PROCESSING

At the individual level

11.- Feeding. Introduction. Feeding behavior to the sea. Feeding in plankton. Feeding in coastal and deep benthos. Methodology of food study.

12.- Reproduction. Introduction: reproduction at sea (biomass renewal). Adaptations to ensure reproduction. Reproduction in plankton. Reproduction in benthos. Type of development at sea. Methodology of reproduction study.

At the ecosystem level

13.- The biotic interrelations. Introduction. Competition and coexistence. Predation in benthos and plankton, strategies to protect against predation. The symbiosis in the sea: parasitism, mutualism and commensalism.

14.- The transfer of energy. Trophic networks. Introduction. Trophic chains and energy transfer. Estimation of secondary production. Trophic networks. The microbial loop. Comparison between marine and terrestrial production.

V. ENVIRONMENT-MAN (INTERACTION OF MAN'S ACTIVITY ON THE MARINE ENVIRONMENT)

15.- The impact of man. Type of uses of the sea. Industrial and agricultural installations and activities. Exploitation of its abiotic and biotic resources.
Protection and conservation. Protection tools. Threats and threatened species. Conservation and management of the coastal strip.

PRACTICAL CLASSES:

Practice 1. To two different beaches, collection of biological samples and measurement of abiotic parameters of the coastal zone. Labeling and conservation.

Practice 2. (performed in 3 sessions of 4 h) Sample processing. Separation of samples, analysis, identification, data collection. Treatment of results. Elaboration of a written work.

Practice 3. Discussion of results of practical classes.

Parctice 4. Correction of the practice article.

Methodology

The methodology used in this subject to achieve the learning process is based on making the student work the information that is available to him. The role of the teacher is to give the information or tell you where you can get it and help, tutored to give, so that the learning process can be done effectively. To achieve this goal, the subject is based on the following activities: master classes, seminars, lab and field practices and tutorial meetings.

Activities

Title	Hours	ECTS	Learning outcomes
Type: Directed			
Classroom lectures	2	0.08	4, 3, 6
Field practices	12	0.48	1, 4, 5, 7
Lab practices	12	0.48	4, 5, 2
Seminar	4	0.16	4, 3, 6, 2
Theory lessons	20	0.8	3, 6, 5, 2
Type: Supervised			
Tutorial meeting	6	0.24	3, 6
Type: Autonomous			
Autonomous study and self-study work	56	2.24	4, 3, 6
Preparation of work, resolution of issues and problems	33	1.32	4, 3, 6

Evaluation

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"

Evaluation activities

Title	Weighting	Hours	ECTS	Learning outcomes
Active participation in classes and seminar. Evaluation of deliveries of the related exercises.	5%	0	0	3, 6, 2
Assistance and use of field and laboratory practices	10%	0	0	1, 7
Correction and delivery of the practice article	30%	1	0.04	4, 5, 7
Fisrt partial theory	35.75%	2	0.08	4, 3, 6
Second partial theory	19.25%	2	0.08	4, 3, 6

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.

Castro, P. y Huber M. E. 2007. Biología Marina. McGraw-Hill , Madrid.

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. 2005. Marine Ecology. Processes, Systems and impacts. Oxford University Press, Oxford.

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.

Miller, C. B. 2004. Biological Ocenaography. Blackwell Publishing, Oxford.

Pinet, P.R. 2000. 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://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.

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.