Syllabus

Subject

Subject / Group	11665 - Marine Ecology / 1
Degree	Master's in Marine Ecology
Credits	6
Period	1st semester
Language of instruction	Spanish

Professors

Lecturers	Office hours for students					
	Starting time	Finishing time	Day	Start date	End date	Office / Building
Nona Sheila Agawin Romualdo nona.agawin@uib.es	You need to book a date with the professor in order to attend a tutoring session.					

Context

This guide has been written according to the guidelines established for the subject of Marine Ecology of the study plan of the offcial titleof Masters in Marine Ecology of the University of the Balearic Islands. The course is an obligatory subject within the structural module of the Master.

The course provides concepts, approaches and methods of marine ecology for the students to have the necessaryknowledge and tools to embark on studies related with marine ecology.Because of the multificated nature of marine ecology, the course covers interdisciplinary topics (e.g.biological oceanography, physical oceanography, biogeochemistry) relevant to marine ecology.The course starts with the brief history of marine ecology as a discipline and as a branch of ecology in which the concepts, approaches and methods are inspired from terrestrial and freshwater or limnological ecology. The course then covers the physical environment of marine ecosystems, information on producers and consumers and how they relate with each other and their environment, structure and dynamics of marine communities and how they are maintained over time and space. Finally, information on the functioning of marine ecosystems is covered in relation to biogeochemical cycles, and consequences of human impact on marine ecosystems.

As marine ecology is a growing discipline, the course provides knowledge of basic concepts, elements and processes as well as new relevant information.Experts (as supporting professors) are invited to give seminars on topics related with marine ecology. The course can be partially or totally in english if the students agree.

Requirements

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Recommended

Basic knowlede on ecology is recommended

Skills

Specific

* Acquire basic training on the parameters and environmental characteristics of the marine environment in general, and the Mediterranean Sea in particular.
* Know the dynamics of the oceans from the coupling between the atmosphere and oceans, and how the entire shallow and deep circulation system is modeled.
* To distinguish and recognize the components of plankton, nectonic and benthic communities, as well as the trophic relationships between them and aspects related to the overall metabolism of marine ecosystems.

Generic

* To expand the knowledge and understandings about the marine environment acquired in the respectives degrees of the students, providing the necessary elements for the development and implementation of ideas in both basic research and applied work.
* Develop a critical and self-critical attitude, both scientifically and in other areas of application of their knowledge.

Transversal

* You can consult the basic competencies that the student will have to acquire at the end of the Master's degree at the following address http://estudis.uib.cat/es/master/comp_basiques/

Basic

* You may consult the basic competencies students will have to achieve by the end of the Master's degree at the following address: http://estudis.uib.cat/master/comp_basiques/

Content

Range of topics

Theme 1. Marine Ecology (Introduction)

1. Historical perspective
2. Situation of marine ecosystems in the global context of aquatic ecosystems
3. General characteristics of marine ecosystems

Theme 2. Physical environment

1. Solar radiation
2. Temperature and heat flow
3. Density and stability in atmosphere and ocean
4. Atmosphere and ocean dynamics
5. Small-scale dynamics

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Theme 3. Primary producers in the marine environment

1. Types of marine producers
2. Primary production: photosynthesis, chemosynthesis
3. Methods of biomass measurement and production
4. Contributions by different primary producers in the marine environment
5. Primary production controls (light, nutrients, temperature)

Theme 4. Consumers in the marine environment

1. Consumer population dynamics
2. Competition for resources between consumers
3. Transfer of organic matter
4. Grazing and predation
5. Selection of food and capture by consumers
6. Methods of measurement

Theme 5. Structure and dynamics of marine communities

A. Structure of the food web and its controls

1. Definition of the food network
2. Food structure controls: historical development
3. Top-down control
4. Bottom-up control
5. Atmospheric and oceanographic effect on the food chain network
6. Trophic "bottom-up" cascades
7. Interaction between "top-down" and "bottom-up"
8. The controls today

B. Spatial structure

C. Temporalstructure

D. Diversity as an indicator of ecosystem structure

1. The concept of diversity
2. Entity distributions
3. Measuring diversity
4. Information theory and diversity
5. Meaning of Diversity Values

E. Stability and complexity of ecosystems

1. Stability of models and systems
2. Example of reference stability and ecological succession
3. Complexity in stable states

Theme 6. Functioning of marine ecosystems

1. Carbon cycle (organic and inorganic)
2. Nutrient cycle in ecosystems (Phosphorus, Nitrogen and Sulfur)

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3. Micronutrients

Teaching methodology

In-class work activities (2.12 credits, 53 hours)

Modality	Name	Typ. Grp.	Description	Hours
Theory classes	Participative theoretical classes	Large group (G)	Theessential concepts thatconstitute the basis of Marine Ecology will be explained throughpresentations/lecturesby the professor, on the whiteboardor using projection systems,anddialogue with the students will be encouraged on issues that may be problematic for them.	34
Theory classes	Oral presentations	Large group (G)	It consists of oral presentations by each of the groups before their colleagues of a topic prepared through autonomousindividual and group work under the advice of the professor. Thetopics will be specific cases related to the contentsof the course.	4
Practical classes	Laboratory work	Medium group (M)	Laboratory work on the material collected in the field, using chemical and biological techniques. Activities are designed as practical applications of the theoretical contents of the course.	15

At the beginning of the semester a schedule of the subject will be made available to students through the UIBdigital platform. The schedule shall at least include the dates when the continuing assessment tests will be conducted and the hand-in dates for the assignments. In addition, the lecturer shall inform students as to whether the subject work plan will be carried out through the schedule or through another way included in the Aula Digital platform.

Distance education tasks (3.88 credits, 97 hours)

Modality	Name	Description	Hours
Group or individual self-study	Study of the themes	Understanding the theoretical concepts and practical content of the subject	50
Group or individual self-study	Work and oral presentations	Development of the assignedbibliographical work and preparation of an oral presentation	27
Group or individual self-study	Written report	After analysis of samples and data, a writtenreport will be prepared	20

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Specific risks and protective measures

The learning activities of this course do not entail specific health or safety risks for the students and therefore no special protective measures are needed.

Student learning assessment

Frau en elements d'avaluació

In accordance with article 33 of Regulation of academic studies, "regardless of the disciplinary procedure that may be followed against the offending student, the demonstrably fraudulent performance of any of the evaluation elements included in the teaching guides of the subjects will lead, at the discretion of the teacher, a undervaluation in the qualification that may involve the qualification of "suspense 0" in the annual evaluation of the subject".

Participative theoretical classes

Modality	Theory classes
Technique	Objective tests **(retrievable)**
Description	Theessential concepts thatconstitute the basis of Marine Ecology will be explained throughpresentations/ lecturesby the professor, on the whiteboardor using projection systems,anddialogue with the students will be encouraged on issues that may be problematic for them.
Assessment criteria	Assimilation and understanding of the contents of the course which allowscorrect response of questions and resolution of problems. For questions which needs explications, the written and correct expression of the points andability to argue and defend a particular point of view will be evaluated.

Final grade percentage: 50%with a minimum grade of 5

Oral presentations

Modality	Theory classes
Technique	Oral tests **(non-retrievable)**
Description	It consists of oral presentations by each of the groups before their colleagues of a topic prepared through autonomousindividual and group work under the advice of the professor. Thetopics will be specific cases related to the contentsof the course.
Assessment criteria	The professorwill evaluate the presentations and the evaluation criteria shall take into account the quality of the work carried out through (1) work scheme, (2) the contents and references provided, (3), structuring and coordination between the different parts(4) the assimilation and understanding of the contents, and (5) the ability to argue and defend the answers to thequestions.

Final grade percentage: 25%with a minimum grade of 5

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Laboratory work

Modality	Practical classes
Technique	Student internship dissertation **(retrievable)**
Description	Laboratory work on the material collected in the field, using chemical and biological techniques. Activities are designed as practical applications of the theoretical contents of the course.
Assessment criteria	The evaluation is based on (1) quality of the work presented, (2) the understanding of the contents of the work, (3) execution of the work, (4) timely submission of the work according to the deadline.

Final grade percentage: 25%with a minimum grade of 5

Resources, bibliography and additional documentation

Basic bibliography

BIGG, G. 2003.- The Oceans and Climate. Cambridge University Press. Cambridge.
BARNES, R.S.K. & K.H. MANN (Edits.) 1995. Fundamentals of Aquatic Ecology. Blackwell Science. Oxford.
KENNISH, M,J. (Edit.) 1994. Practical Handbook of Marine Science.- CRC Press. London.
RODRÍGUEZ MARTÍNEZ, J. 2016.- Ecología (4ª edición). Piràmide. Madrid.
VALIELA, I. 2006.- Global Coastal Change. Blackwell. Oxford.
VALIELA, I.2015. Marine Ecological Processes. Springer. New York.
Frontiers, S. 1985. Diversity and structure in aquatic ecosystems in oceanography and marine Biology. An annual review (ed E. Barnes). Aberdeen University Press. Aberdeen 153-312.
Greig-Smith P. 1983. Quantitative Plant Ecology. Blackwell. Oxford.
Magurran A.E. 1989. Diversidad Ecológica y su Medición. Ediciones Vedrá. Barcelona. 200pp
Margalef R. 1974. Ecologia. Blume. Barcelona
Margalef R. 1968. Perspectives in ecological theory. University of chicago Press. Chicago.
May R. 1973. Stability and Complexity in Model Ecosystems. Princenton University Press
May R. 1985. Theoretical Ecology. Principles and Applications. Blackwell. Oxford
Pielou E.C. 1969. An Introduction to Mathematical ecology.Wiley. New York
Pielou E.C 1985. The interpretation of ecological data. Wiley. New York
Pielou 1975 Ecological ediversity. Wiley. New York
Pianka E.R. 1983. Evolutionary Ecology. Harper and Row. New York
Pimm S.L. 1984. Food Webs. Chapmann and Hills. London
Poole R.W. An Introduction to Quantitative ecology. MacGrawHill.Kopgakusha.Tokyo

Complementary bibliography

Begon M, Howarth RW, Townsend CR. 2014. Essentials of Ecology 4thedition.Blackwell Publishing.Massachussets.
Begon M, Townsend CR and Harper JR. 2005.Ecology: From Individuals to Ecosystems, 4th Edition. Wiley-Blackwell. New York.
Cain ML, Bowman WD, Hacker SD. Ecology. 2011.Sinauer Associates Inc. Massachusetts.
Krebs CJ. 2009.Ecology: The experimental Analysis of Distribution and Abundance, 6th edition. Benjamin Cummings.San Francisco.
Krebs CJ. 2008.The Ecological World View. CSIRO Publishing. Collingwood.
Margalef R.2005.Ecología.Ediciones Omega.Barcelona.
Odum EP and Barrett. 2005.Fundamentals of Ecology 5thed. Thomson Brooks/Cole. Belmont.

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Odum EP.1983.Basic Ecology.Saunders College Publishing.New York.
Ricklefs, RE. 2010.The Economy of Nature, 6th Edition. W.H. Freeman. New York.
Smith TM and Smith RL.2009.Elements of Ecology. 7thed. Benjamin Cummings-Pearson. Menlo Park, San Francisco. CA.
Hopkins, B. 1957. The concept of minimal area. J. Ecol l45:441-9
Hulbert, S.H. 1971. The nonconcept of species diversity: a critique and alternative parameters. Ecology 52: 577-80
Mc Arthur, R. H. 1965. Patterns of species diversity. Bio. Rev. 40: 510-33
Fisher, R; A.S. Corbett and C.B. Williams. 1981. The relation between the number of species and the number of individuals in a random sample of an animal population. J. Am. Ecol 12:42-58
Niell F.X.2005. La debilidad de un concepto :La complejidad de los sistemas naturales.Encuentros en la biología 100
Niell F.X. 2005. La biodiversidad:una perdida de patrimonio 101-138 in Viguera, E; A, Grande y J. Lozano.Encuentros en la ciencia, del macrocosmos al microcosmos. F gutierrez marí Málgha
Niell, F.X. 2009. La selección es una lista de esquelas anónimas. Encuentros en la Biología. 28123
Niell F.X. 2013. El marco conceptual de la biodiversidad. La diversidad del paisaje mediterráneo. Jave4ga 101.7-18
Preston F.W. (1985) The canonical distributionof communess and rarity. Ecology. 43:254-83
Pimm S.L .1984. The complexity and stability of Ecosystems .Nature.307:321-6
Routledge R.D. 1977. On Wittaker's components of Diversity. Ecology 58:1120-7
Routledge R.D. 1979. Diversity indices:which ones are admisible. Theor. Biol.76:503-515
Simberloff D.1986. Properties of rarefaction diversity measurements. Amer. Nat. 106:414-415
Whittaker R.H. 1972. Evolution and measurements of species diversity.Taxon 21:215-251

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