

Course guide

250556 - QUIMEDMARI - Marine Environment Chemistry

Last modified: 19/06/2024

Unit in charge: Barcelona School of Civil Engineering
Teaching unit: 751 - DECA - Department of Civil and Environmental Engineering.

Degree: BACHELOR'S DEGREE IN MARINE SCIENCE AND TECHNOLOGY (Syllabus 2018). (Compulsory subject).

Academic year: 2024 **ECTS Credits:** 6.0 **Languages:** Spanish

LECTURER

Coordinating lecturer: DAVID TORRENS MARTÍN

Others:

DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

Specific:

13388. To know and apply the lexicon and concepts of the Marine Sciences and Technologies and other related fields.
13390. Establish a good practice in the integration of common numerical, laboratory and field techniques in the analysis of any problem related to the marine environment.
13395. 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.

Generical:

13380. Develop a professional activity in the field of Marine Sciences and Technologies.
13381. Address in a comprehensive manner the analysis and preservation of the marine environment with sustainability criteria.

TEACHING METHODOLOGY

The subject consists of 4.0 hours per week of classroom lessons in the classroom (large group). Of these, and as an average throughout the course, they dedicate 1 hour to the resolution of problems with a greater interaction with the student. Practical exercises are carried out in order to consolidate the general and specific learning objectives. Support material is used in the format of a detailed teaching plan through the ATENEA virtual campus: contents, programming of assessment activities and directed learning and bibliography.

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.

LEARNING OBJECTIVES OF THE SUBJECT

This course focuses on the study of the composition of seawater and the relationship between the oceans and the atmosphere. These topics will be developed through the study of the origin, distribution and evolution of the salinity of ocean waters, the chemistry of gas-liquid interactions, and the description of organic compounds (both natural and anthropogenic) and their role in a variety of oceanic processes.

- 1.- Seawater composition. Salinity. Gases solubility and ocean-atmosphere exchange processes.
- 2.- Structure of organic compounds. Reactivity and isomerism of organic compounds. Hydrocarbons: classification and reactions. Organic stereochemistry
- 3.- Organic reactivity. Carbon compounds in the marine environment: structure and reactivity.



STUDY LOAD

Type	Hours	Percentage
Hours large group	30,0	20.00
Hours medium group	15,0	10.00
Self study	90,0	60.00
Hours small group	15,0	10.00

Total learning time: 150 h

CONTENTS

Chemical composition of seawater

Description:

Presentation of the course. Components of seawater: major and minor elements

Salinity, temperature and density of sea water

Solubility of gases and processes of ocean-atmosphere exchange

Exercises

Full-or-part-time: 16h 48m

Theory classes: 5h

Practical classes: 2h

Self study : 9h 48m

Evaluation

Description:

Directed activity 3 - Resolution of a practical case

Full-or-part-time: 21h 36m

Theory classes: 1h

Laboratory classes: 8h

Self study : 12h 36m

Fundamentals of Organic Chemistry

Description:

Structure and classification of organic compounds

Acidity of organic compounds. Resonance

Isomerism and stereochemistry

Introduction to the reactivity of organic compounds: types of reactions and mechanisms

Exercises

Full-or-part-time: 33h 36m

Theory classes: 10h

Practical classes: 4h

Self study : 19h 36m



Hydrocarbons and derivatives

Description:

Saturated hydrocarbons: alkanes and cycloalkanes. Conformational analysis.

Unsaturated hydrocarbons: alkenes and alkynes

Aromatic hydrocarbons

Exercises

Full-or-part-time: 24h

Theory classes: 6h

Practical classes: 4h

Self study : 14h

Properties and reactivity of functional groups

Description:

Alkyl halides: nucleophilic substitution and elimination

Ethers, alcohols and phenols

Exercises

Carbonyl compounds: ketones, aldehydes, carboxylic acids and derivatives

Amines and nitrogen compounds

Field trip / laboratory

Exercises

Full-or-part-time: 48h

Theory classes: 10h

Practical classes: 6h

Laboratory classes: 4h

Self study : 28h

GRADING SYSTEM

--- Continuous assessment ---

The final grade of the subject is obtained from the continuous assessment grades:

- 2 partial tests (30% each)
- 1 group work (15%)
- directed activities (25%).

The teacher will provide the students with the details and evaluation criteria during the first week of the course.

--- Re-evaluation ---

Students suspended in the *continuous evaluation who have appeared regularly in the subject's evaluation tests will have the option to take a re-evaluation test in the period set in the academic calendar.

Students who have already passed the subject or those qualified as not presented or who have not completed all of the course's evaluable exercises will not be able to take the reassessment test.

The re-evaluation will consist of a single test covering all the content of the course. The maximum grade for the reassessment will be five (5.0) and the final grade for the course will be the highest grade between the continuous assessment and the reassessment test.

Extraordinary assessments may only be carried out in the case of students who, due to accredited force majeure, have not been able to take any of the continuous assessment tests.

These extraordinary tests must be authorized by the head of studies, at the request of the teacher responsible for the subject, and will be carried out within the corresponding teaching period.

EXAMINATION RULES.

If any of the directed activities, work or partial continuous assessment tests are not carried out in the scheduled period, it will be considered a zero score.

The tests will be carried out individually, with questions of different types:

- Multiple choice, true/false, concepts to be related (errors deduct score),
- Brief questions and exercises to be developed that can be theoretical or for solving practical problems.

BIBLIOGRAPHY

Basic:

- Pilson, M.E.Q. An introduction to the chemistry of the sea. 2nd ed. Cambridge: Cambridge University Press, 2013. ISBN 9780521887076.
- Bruice, P.Y. Química orgánica. 5a ed. Naucalpan de Juárez, MX: Pearson Prentice Hall, 2008. ISBN 9789702607915.
- Wade, L.G. Química orgánica: vol. 1 [on line]. 9a ed. Mexico: Pearson Educación, 2016 [Consultation: 29/10/2020]. Available on: http://www.ingebook.com/ib/NPcd/IB_BooksVis?cod_primaria=1000187&codigo_libro=6676. ISBN 9786073238472.
- Gorchs, R.; Galán, A. Química orgànica: estudi, reactivitat i aplicació dels principals compostos orgànics [on line]. Barcelona: Edicions UPC, 2003 [Consultation: 29/04/2020]. Available on: <http://hdl.handle.net/2099.3/36492>. ISBN 9788483017395.
- Prestch, E.; Clerc, T.; Seibl, J.; Simon, W. Tablas para la elucidación estructural de compuestos orgánicos por métodos espectroscópicos. Madrid: Alhambra, 1980. ISBN 8420507628.
- Sales, J.; Vilarrasa, J. Introducció a la nomenclatura química: inorgànica i orgànica. 5a ed. Barcelona: Reverté, 2003. ISBN 8429175512.