Course guide
250573 - GEODINAMAR - Marine Geodynamics

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: 2022 ECTS Credits: 6.0 Languages: Spanish

LECTURER

Coordinating lecturer: MARCOS ARROYO ALVAREZ DE TOLEDO

Others: MARCOS ARROYO ALVAREZ DE TOLEDO, ALBERT FOLCH SANCHO, ANNA RAMON TARRAGONA, ENRIQUE EDGAR ROMERO MORALES, DANIEL TARRAGÓ MUNTÉ

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.
13392. Evaluate the bio- and geo-diversity of the marine environment, identifying habitats and ecosystems with multidisciplinary criteria.
13394. Address the most relevant processes and their interactions related to their physical / chemical / biological / geological components, applying technical and scientific knowledge and criteria.
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.
13397. Carry out environmental impact, management and protection studies of the marine environment and adjacent coastal areas, including the corresponding infrastructures and their related impacts.
13401. Apply spatial and cartographic representation techniques for different environments and scales.
13403. 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.
13404. Set, plan and execute basic and applied research in the field of Marine Sciences and Technologies.
13405. Carry out calculations, assessments, surveys and inspections in coastal and marine environments, as well as the corresponding technical documents.
13406. Write technical reports and disseminate knowledge about the different components of the marine system, considering the applicable legal framework.
13407. 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.

Generical:
13380. Develop a professional activity in the field of Marine Sciences and Technologies.
13382. Apply state-of-the-art methods and techniques in oceanography and marine climate, jointly covering the physical, chemical, geological and biological aspects.
13383. 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.
13386. Encompass and teach studies in the different research lines that converge in Marine Sciences and Technologies.
13387. Combining preservation with economic activity within the framework of current legislation promoting the development of a social and environmental awareness.
TEACHING METHODOLOGY

The subject consists of 4 hours a week of face-to-face classes in a classroom.

On average, 2.3 hours are devoted to theoretical classes in a large group, in which the teacher exposes the basic concepts and materials of the subject and presents examples.

On average, 1.2 hours (medium group) are dedicated to solving problems with greater interaction with students. Practical exercises are carried out in order to consolidate the general and specific learning objectives.

The rest of the weekly hours are devoted to laboratory practices.

Support material is used in the form of a detailed teaching plan through the ATENEA virtual campus: content, programming of evaluation and directed learning activities, and bibliography.

Note: The language in which the course is taught will be Spanish minus the classes of Professor Albert Foch who will teach them in Catalan.

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

In this subject, fundamental aspects of geological oceanography will be addressed, reviewing the formation processes of the earth, atmosphere and the ocean. Aspects of surface and stratigraphic exploration of the seabed, magnetic and satellite explorations will be introduced; sedimentary processes and the study of paleo climate through the geological study of chemical and biological processes. Oceanic floor formation processes, underwater volcanism, and underwater slope stability will also be studied. Finally, topics related to marine resources will be reviewed.

1.- Concepts of internal Geodynamics: Understand the geosphere, its structure and composition. The energy balance of the earth. Internal Geodynamics as well as its effects on tectonics and seismic / volcanic phenomena. Hydrothermal vents and the production of mineral nodules.


3.- Understand the processes of production, erosion and sedimentation at the seabed. Understand the concepts of sedimentation, stratigraphy and paleoclimate.

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.

STUDY LOAD

<table>
<thead>
<tr>
<th>Type</th>
<th>Hours</th>
<th>Percentage</th>
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</thead>
<tbody>
<tr>
<td>Hours large group</td>
<td>30,0</td>
<td>20.00</td>
</tr>
<tr>
<td>Hours medium group</td>
<td>15,0</td>
<td>10.00</td>
</tr>
<tr>
<td>Self study</td>
<td>84,0</td>
<td>56.00</td>
</tr>
<tr>
<td>Hours small group</td>
<td>15,0</td>
<td>10.00</td>
</tr>
<tr>
<td>Guided activities</td>
<td>6,0</td>
<td>4.00</td>
</tr>
</tbody>
</table>

Total learning time: 150 h
## CONTENTS

### Soil mechanics

**Description:**
- description and classification of soils
- Effective stress
- Shear strength
- Shear strength (problems)
- Permeability and flow
- Consolidation
- Permeability and flow

**Full-or-part-time:** 43h 12m
- Theory classes: 9h
- Practical classes: 4h
- Laboratory classes: 5h
- Self study: 25h 12m

### Offshore site investigation

**Description:**
- Geophysics
- Sampling
- On-site tests

**Full-or-part-time:** 16h 48m
- Theory classes: 4h
- Practical classes: 3h
- Self study: 9h 48m

### Geomorfologia submarina

**Description:**
- Mechanisms of marine geomorphological evolution
- Sedimentary basins
- Cannons
- Coastal features
- underwater volcanism (problems)
- plains and trenches

**Full-or-part-time:** 36h
- Theory classes: 13h
- Practical classes: 2h
- Self study: 21h
Offshore geological risks

Description:
danger and risk
Submarine landslides
Submarine landslides
Seismicity
 tsunami
Gas emissions

Full-or-part-time: 48h
Theory classes: 12h
Practical classes: 2h
Laboratory classes: 6h
Self study: 28h

GRADING SYSTEM

The mark of the course is obtained from the ratings of continuous assessment and their corresponding laboratories and/or classroom computers. Continuous assessment consist in several activities, both individually and in group, of additive and training characteristics, carried out during the year (both in and out of the classroom). The teachings of the laboratory grade is the average in such activities. The evaluation tests consist of a part with questions about concepts associated with the learning objectives of the course with regard to knowledge or understanding, and a part with a set of application exercises. Criteria for re-evaluation qualification and eligibility: students that failed the ordinary evaluation and have regularly attended all evaluation tests will have the opportunity of carrying out a re-evaluation test during the period specified in the academic calendar. Students who have already passed the test or were qualified as non-attending will not be admitted to the re-evaluation test. The maximum mark for the re-evaluation exam will be five over ten (5.0). The non-attendance of a student to the re-evaluation test, in the date specified will not grant access to further re-evaluation tests. Students unable to attend any of the continuous assessment tests due to certifiable force majeure will be ensured extraordinary evaluation periods. These tests must be authorized by the corresponding Head of Studies, at the request of the professor responsible for the course, and will be carried out within the corresponding academic period.

BIBLIOGRAPHY

Basic:

Complementary: