Course guides
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: 2020  ECTS Credits: 6.0  Languages: Catalan, Spanish, English

LECTURER
Coordinating lecturer: MARCOS ARROYO ALVAREZ DE TOLEDO
Others: MARCOS ARROYO ALVAREZ DE TOLEDO, ALBERT FALQUES CASANOVAS, ALBERT FOLCH SANCHO, ANNA RAMON TARRAGONA, ENRIQUE EDGAR ROMERO MORALES

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 course consists of 2.3 hours per week of classroom activity (large size group) and 1.2 hours weekly with half the students (medium 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 1.2 hours in the medium size groups is devoted to solving practical problems with greater interaction with the students. The objective of these practical exercises is to consolidate the general and specific learning objectives.

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.

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>
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</tbody>
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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
- underwater volcanism; ridges and islands
- underwater volcanism (problems)
- plains and trenches
- pockmarks

**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
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.

BIBLIOGRAPHY

Basic: