Course guide
250580 - INFCOSIMGI - Coastal Infrastructures. Impacts and Integral Management

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). (Optional subject).
Academic year: 2022  ECTS Credits: 6.0  Languages: Catalan

LECTURER

Coordinating lecturer: VICENTE GRACIA GARCIA
Others: FRANCESC XAVIER GIRONELLA I COBOS, VICENTE GRACIA GARCIA, JOSE ANTONIO JIMENEZ QUINTANA

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.
13391. Participate and eventually lead multidisciplinary work teams in the field of Marine Sciences and Technologies to respond to the social challenges related to this field.
13393. Evaluate the dynamics of seas and oceans at different scales, identifying water masses and their properties. (Specific competence of Marine Science and Engineering Mention)
13394. Address the most relevant processes and their interactions related to their physical / chemical / biological / geological components, applying technical and scientific knowledge and criteria.
13396. To set, analyze and optimize the functionality of actions and infrastructures in the marine environment. (Specific competence of the Marine Science and Engineering Mention)
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.
13398. Carry out operational predictions in the open sea and coastal areas, including the corresponding risk maps. (Specific competence of the Marine Science and Engineering Mention)
13400. Use state-of-the-art mathematical models in the marine field to analyze impacts and interactions with socio-economic activities supported by this environment. (Specific competence of the Marine Science and Engineering Mention)
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.

General:
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.

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 subject will show the most important aspects related to coastal and port engineering, emphasizing the fundamental aspects of the design of port and coastal works, and the principles of structural and functional design of protection works. Subsequently, the basics of port exploitation will be given, as well as port organization and administration. Finally, aspects of maritime traffic management will be introduced.

1. Characterize the marine environment as a multi-component system, emphasizing the inter-relations between this and the socio-economic and administrative aspects.
2. Identify the main conflicts and pressures and try to minimize them in the project and management phase.
3. Know the main laws and / or applicable regulations and the various initiatives of a global nature.

The topics addressed in this matter cover most of the physical, environmental and ecological problems and challenges identified by the scientific community and the social agents that the coastal zone will face in the near future under different development scenarios and climate change.

STUDY LOAD

<table>
<thead>
<tr>
<th>Type</th>
<th>Hours</th>
<th>Percentage</th>
</tr>
</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

Introduction

Description:
Show a view of the state of the coast
Show examples of dikes on the coast
Presentation of the main coastal protection works

Specific objectives:
Introduce basic concepts of literal cell and coastal problems
Introduce the main types of dikes
To show the main coastal protection works

Full-or-part-time: 9h 36m
Theory classes: 4h
Self study : 5h 36m

Driving terms

Description:
Wave climate
The average sea level
Wave climate exercice

Specific objectives:
Characterize the waves by the design of coastal infrastructures
Characterize variations in mean sea level
Extrem function fitting exercices

Full-or-part-time: 14h 23m
Theory classes: 4h
Practical classes: 2h
Self study : 8h 23m
Coastal infrastructures and impacts

Description:
Types of breakwaters, design and construction, impact on the coast
Exercises in functional and resistive design class
Real case study where previous knowledge will be applied
Types of breakwaters, design and construction, impact on the coast
Real case study where previous knowledge will be applied
Types of breakwaters, design and construction, impact on the coast
Exercises in functional and resistive design class
Real case study where previous knowledge will be applied
nourishment types, sediment origin, dredging operations, efficiency evaluation
Exercises in functional design class
Port works

Specific objectives:
Functional and resistant design
Coastal impact assessment
Preliminary design of a case study
Functional design
Assess the impact on the coast
Functional and resistant design
Solve problems related to functional and resistive design
Case study of overtopping assessment
Functional design
Carry out the design of a beach nourishment at preliminary project level

Full-or-part-time: 72h
Theory classes: 12h
Practical classes: 8h
Laboratory classes: 10h
Self study: 42h

Coastal management

Description:
Description of the administrative limits, the coastal zonificaition from a legal perspective
Based on previous experiences, the concepts of coastal management are introduced, especially on the Catalan coast.
Global and Mediterranean climate projections
Define adaptation routes for different climate change scenarios

Specific objectives:
Describe the coastal organizational system in Spain
Show concepts related to integrated coastal management
Provide a view of the coast from a holistic, systemic perspective and with changing management alternatives
Define adaptation routes for different climate change scenarios

Full-or-part-time: 33h 36m
Theory classes: 10h
Practical classes: 4h
Self study: 19h 36m

Evaluation

Full-or-part-time: 14h 23m
Laboratory classes: 6h
Self study: 8h 23m
**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:**

**Complementary:**