Coastal Sustainability: Defence and Realignment (250601)

General information

School:	ETSECCPB
Departments:	Departament d'Enginyeria Civil i Ambiental (DECA)
Credits:	5.0 ECTS
Programs:	MÀSTER UNIVERSITARI ERASMUS MUNDUS EN ENGINYERIA I GESTIÓ COSTANERA I MARÍTIMA, pla 2022 - (codi pla 1525), MÀSTER UNIVERSITARI ERASMUS MUNDUS EN ENGINYERIA I GESTIÓ COSTANERA I MARÍTIMA, pla 2013 - (codi pla 1090)
Course:	2023/2024

Main teaching language at each group

- Group 10Q2 English (Q2)

Faculty

Responsible faculty: Vicente Gracia Garcia

Teacher: Vicente Gracia Garcia

Generic objectives

Students will acquire the necessary knowledge for the design of coastal protection works and strategies and the evaluation of their impacts in the adjacent coasts. This includes an overview of mechanisms and processes that generate coastal conflicts. It also covers the functional design solutions to these problems, both as a function of its origin and nature of the area where they operate.

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Skills

Specific skills

MetOcean main physical processes and their effects on the port and waterways infrastructure.

Port planning and operation.

Environmental issues before and after construction of e.g. a port.

Entrepreneurship and corporate social responsibility.

How climate change uncertainties can be managed to reduce risks when designing and operating resilient infrastructure.

Perform risk management (concepts and techniques).

Know how to make the stakeholders and community to work together to make a project acceptable and wanted.

Coastal hydrodynamics and processes.

Short-term and long-term wave climate.

Sediment transport and morphology.

Coastal and oceanographic numerical modelling.

Coastal vulnerability within a sustainable framework.

Developing beach management strategies for real-world coastal systems.

The basis behind climate change and its effect on the coast.

Design coastal interventions.

Understand and predict the impacts of coastal interventions.

Offer alternatives to hard coastal engineering.

Analyse and interpret collected field data in order to understand the physical drivers at short, mid and long-time or climatic scales.

Apply state-of-the-art wave, flow and morphological models.

Compute the risk, vulnerability and hazard analysis including the decadal (climatic) scale.

Generic skills of subject

Design methods for ports, waterways and other coastal facilities.

Dredging and disposal solutions for contaminated sediments.

Design and operation of inland waterways hydraulic structures and riverbanks.

Social responsibility of business and entrepreneurship.

Develop knowledge and understanding of the coastal environment at an advanced level, applying classic (hard and soft) coastal engineering complemented with building with nature concepts, with ability to analyse, evaluate, assess and synthesis of data and information from different sources with contemporary techniques and technologies.

Handle engineering problems dealing with waves, currents, their interactions, their effects on the coastline and man-made interventions, spanning from short (storms) to decadal scales, to incorporate the climate change dimension.

Propose creative and innovative solutions by themselves or as a work group for current and future problems by enhancing their own interpersonal understanding, work as a team and oral and written communication skills.

ECTS credits: total hours of student work

		Dedication	
		Hours	**Percent**
Supervised Learning	**Theory**	26.00	57.8%
	Assignments	19.00	42.2%
	Laboratory	0.00	0.0%
	Supervised activities	0.00	0.0%
Self-Learning		80.00	

Contents

Introduction

Dedication

1.0h. Theory + 4.0h. Assignments

Description

Description of the subject, introduction of concepts related to coastal management, and evaluation method

Define the time and spatial scales responsible for coastal changes in order to subsequently define the most appropriate management works

Objectives

Show students the content, organization of the course and evaluation method.

Identify the time and space scales on sandy beaches from real beach profile data obtained on the Catalan coast.

Driving terms. Waves and medium level

Dedication

4.0h. Assignments

Description

The waves and mean water level oscillations will be characterized based on real data recorded at different locations along the Spanish coast. It is intended to provide the necessary tools to be able to characterize the driving agents that govern the changes of the coast as a preliminary step to be able to define management policies

Objectives

To determine at any location the conditions of swell and mean sea level.

Sediment transport

Dedication

6.0h. Theory

Description

Show the different methods of calculating cross-shore and longshore sediment transport in order to evaluate the impacts of the works that can be proposed to manage the coast

Objectives

Be able to evaluate sediment transport in a castal stretch.

The use of simple formulas to determine the longshore sediment transport

The use of complex numerical model to determine the evolution of a beach.

Measures to fix the coast

Dedication

4.0h. Theory

Description

Show the parts of a revetment, the examples on the Mediterranean coast, evaluate its impacts on the neighboring beaches.

Objectives

Evaluate the functional design of a revetment

Measures to modulate the beach response

Dedication

9.0h. Theory

Description

Description of this type of work and the variables involved in its functional design. Determine the impacts they cause on the coast. Show real examples of the Catalan coast.

Objectives

Design detached breakwaters and grynes. Assess their impacts on the coast

Measures with sediments

Dedication

11.0h. Assignments

Description

Description of this type of work and the variables involved in its functional design. Determine the impacts they cause on the coast. Show real examples along the Catalan coast mainly.

Objectives

Carry out the functional design of this type of works. Assess their impacts on the coast

New approaches to cope climate change

Dedication

6.0h. Theory

Description

Apply the concept of solutions based on nature on the coast. Different examples of this type of solution will be shown, such as rapid action measures or the combination of coastal space and dune systems

Objectives

Apply the concept of nature-based solutions to the coast.

Activities

Grading rules (*)

(*) The evaluation calendar and grading rules will be approved before the start of the course.

The continuous assessment consists of doing different activities, both individual and group, of an additive and formative nature, carried out during the course (inside and outside the classroom). The grade of the course results from the average of the activities of this type. A non delivered activity has a grade of zero.

In case of not obtaining a grade higher than five, the student may present himself for an extraordinary evaluation consisting of an exam. The maximum mark in this case will be five..

Test rules

Teaching methodology

The course consists of 3 hours per week of classroom activity consisting in formal lectures, classroom exercises with computers and round tables to discuss the results of the proposed home work.

Basic bibliography

- Morang, A. [et al.]. **Coastal engineering manual**. U.S. Army Corps of Engineers. Washington. 2003.
- Herbich, J.B. (ed.). **Handbook of coastal engineering**. McGraw Hill. New York. 2000. ISBN 0071344020.
- Kay, R.; Alder, J. **Coastal planning and management**. Taylor & Francis. Oxon. 2005. ISBN 0415317738.