Coastal Multidisciplinary Project: Sustainable Engineering in the Coastal Zone (250613)

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)
Course:	2023/2024

Main teaching language at each group

- Group 10Q2 English (Q2)

Faculty

Responsible faculty: Octavio Cesar Mösso Aranda

Teachers: Daniel Gonzalez Marco, Octavio Cesar Mösso Aranda

Generic objectives

The main aim of this course is to encourage students to participate as a team in a project, defining or solving present coastal and marine engineering issues with a multidisciplinary approach. The project must be set in a hierarchical logical procedure, integrating engineering, environmental and coastal oceanographic knowledge, to produce a coherent solution at least two time scales.

Skills

Specific skills

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

Numerical and laboratory modelling techniques.

Geotechnical aspects related to foundations for?port and waterways structures.

Management techniques.

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 time and frequency domain analysis of MetOcean data to provide operational and design values.

Design navigational infrastructure with resilience and adaptation to climate change in mind.

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.

Tidal currents.

Coastal and oceanographic numerical modelling.

Physical models for coastal processes, structures and their interactions.

Coastal vulnerability within a sustainable framework.

Field campaigns and data treatment to evaluate problematic situations and plan/design solutions.

Developing beach management strategies for real-world coastal systems.

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

How to cooperate with administrations and private companies.

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.

Take a leadership role in the community, exerting awareness of ethical, cultural and social issues within a global context in the exercise of their professional skills and responsibilities.

ECTS credits: total hours of student work

		Dedication	
		Hours	Percent
Supervised Learning	Theory	15.00	33.3%
	Assignments	7.00	15.6%
	Laboratory	23.00	51.1%
	Supervised activities	0.00	0.0%
Self-Learning		80.00	

Contents

1.- Introduction and approach. Contents and teaching staff

Dedication

3.0h. Theory

Description

Introduction of the contents

Subject approach

Teaching Staff

Lectures

Project proposal and teamworks

Objectives

The aim is to introduce the general contents of the subject, its composition and theoretical-practical-seminar distribution, the evaluation system and the participating teachers.

2.- Planning during the life cycle of the project

Dedication

3.0h. Theory

Description

Project planning Time management Gantt diagram PERT method

Objectives

The main objective is to present the tools for the correct planning of applied and research projects in engineering and marine sciences, organization and temporary management. Introduction to Gantt charts and the PERT method.

3.- The life cycle of the project

Dedication

3.0h. Theory + 7.0h. Assignments + 21.0h. Laboratory

Description

Project phases: from idea to execution Criteria, requirements and objectives Problem-solving strategy Compatible solutions Multi-criteria analysis Justifications

Project Phases: From Idea to Execution Criteria, Requirements and Objectives Strategy for Problem Solving Supported Solutions

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Objectives

The main objective is to address the different phases of a project's life cycle, requirements and objectives, problem solving, justification, etc. allowing the student to achieve a global and integrative view of the life of applied and research projects in engineering and marine sciences.

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4.- Management plan for the data generated and dissemination

Dedication

6.0h. Theory

Description

Data management plan Dissemination and diffusion of results Communication plan

Objectives

The main objective is to present the bases for the organization of data management plans and plans for the dissemination and communication of project results.

5.- Evaluation

Dedication

2.0h. Laboratory

Activities

Grading rules (*)

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

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.

Test rules

Teaching methodology

The course consists of 2 hours per week of classroom activity (large size group) and 0.8 hours weekly with half the students (medium size group).

The 2 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 0.8 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.

Basic bibliography

- Munier, N. **Project management for environmental, construction and manufacturing engineers**. Springer. New York. 2013. ISBN 9789400744769.

- Heerkens, G. **Project management**. McGraw-Hill. New York. 2014. ISBN 9780071818483.
- Crawford-Brown, D.J. **Risk-based environmental decisions: culture and methods**. Springer. New York. 1999. ISBN 9781461373827.