Maritime Constructions (250241)

General information

School:	ETSECCPB
Departments:	Departament d'Enginyeria Hidràulica, Marítima i Ambiental (EHMA)
Credits:	4.5 ECTS
Programs:	GRAU EN ENGINYERIA D'OBRES PÚBLIQUES, pla 2010 - (codi pla 791)
Course:	2014/2015
Course language:	Català

Faculty

Responsible faculty: Jose Antonio Jimenez Quintana

Teachers: Francesc Xavier Gironella I Cobos, Vicente Gracia Garcia, Jose Antonio Jimenez Quintana, Octavio Cesar Mösso Aranda

Generic objectives

Students will develop skills for the construction and preservation of maritime structures.

Upon completion of the course, students will have acquired the ability to: 1. Carry out a wave analysis. 2. Design the basic elements of a port. 3. Carry out a coastal dynamics study that includes port-coast interaction.

The sea, environmental conditions and coastal hydraulics; Regular and irregular wave action; Wave formation, propagation and breaking; Currents and tides; Models; Testing beaches and breakwaters; Port engineering; Types; Areas of water and land; Rubble construction; Rubble breakwaters; Interaction between waves and structures; Stability of exposed and submerged rubble breakwaters; Stability of coatings; Vertical wall breakwater; Coastal engineering; Geomorphology; Coastal protection work; Longitudinal dynamics; Transverse dynamics; Port-coast interaction; Coastal response; Accretion in ports; Interaction in pocket beaches; Beach nourishment

Skills

Specific skills

Ability to construct and conserve maritime works

Knowledge and understanding of the functioning of ecosystems and environmental factors

Knowledge of the design of urban services and utilities to do with water distribution and sewage treatment

Generic skills of subject

ENTREPRENEURSHIP AND INNOVATION - Level 1. Showing enterprise, acquiring basic knowledge about organizations and becoming familiar with the tools and techniques for generating ideas and managing organizations that make it possible to solve known problems and create opportunities.

ENTREPRENEURSHIP AND INNOVATION - Level 2. Taking initiatives that give rise to opportunities and to new products and solutions, doing so with a vision of process implementation and market understanding, and involving others in projects that have to be carried out.

SUSTAINABILITY AND SOCIAL COMMITMENT - Level 2. Applying sustainability criteria and professional codes of conduct in the design and assessment of technological solutions.

TEAMWORK - Level 3. Managing and making work groups effective. Resolving possible conflicts, valuing working with others, assessing the effectiveness of a team and presenting the final results.

Students will learn to identify, formulate and solve a range of engineering problems. They will be expected to show initiative in interpreting and solving specific civil engineering problems and to demonstrate creativity and decision-making skills. Finally, students will develop creative and systematic strategies for analysing and solving problems.

Students will learn to assess the complexity of the problems examined in the different subject areas, identify the key elements of the problem statement, and select the appropriate strategy for solving it. Once they have chosen a strategy, they will apply it and, if the desired solution is not reached, determine whether modifications are required. Students will use a range of methods and tools to determine whether their solution is correct or, at the very least, appropriate to the problem in question. More generally, students will be encouraged to consider the importance of creativity in science and technology.

Students will learn to identify, model and analyse problems from open situations, consider alternative strategies for solving them, select the most appropriate solution on the basis of reasoned criteria, and consider a range of methods for validating their results. More generally, students will learn to work confidently with complex systems and to identify the interactions between their components.

Students will learn to plan, design, manage and maintain systems suitable for use in civil engineering. They will develop a systematic approach to the complete life-cycle of a civil engineering infrastructure, system or service, which includes drafting and finalising project plans, identifying the basic materials and technologies required, making decisions, managing the different project activities, performing measurements, calculations and assessments, ensuring compliance with specifications, regulations and compulsory standards, evaluating the social and environmental impact of the processes and techniques used, and conducting economic analyses of human and material resources.

Students will develop an understanding of the different functions of engineering, the processes involved in the life-cycle of a construction project, process or service, and the importance of systematising the design process. They will learn to identify and interpret the stages in preparing a product design specification (PDS), draft and optimise specifications and planning documents,

and apply a systematic design process to the implementation and operation phases. Students will learn to write progress reports for a design process, use a range of project management tools and prepare final reports, and will be expected to show an awareness of the basic economic concepts associated with the product, process or service in question.

Students will learn to identify user requirements, to draft definitions and specifications of the product, process or service in question, including a product design specification (PDS) document, and to follow industry-standard design management models. Students will be expected to show advanced knowledge of the steps involved in the design, execution and operation phases and to use the knowledge and tools covered in each subject area to the design and execution of their own projects. Finally, students will assess the impact of national, European and international legislation applicable to engineering projects.

THIRD LANGUAGE - Level 3: To carry out an oral presentation in English and to answer to the questions of the audience. Since last aim is precise to reach the level B2 of knowledge of the English language.

ECTS credits: total hours of student work

		Dedication	
		Hours	**Percent**
Supervised Learning	**Theory**	29.00	58.6%
	Assignments	10.00	20.2%
	Laboratory	6.00	12.1%
	Supervised activities	4.50	9.1%
Self-Learning		63.00	

Contents

Marine and Coastal Engineering

Dedication

2.0h. Theory

Description

Basics

Waves, Tides and Currents

Dedication

5.0h. Theory + 2.0h. Assignments + 1.0h. Laboratory

Description

Regular waves.

Random waves.

Wave climate

Wave propagation

Wave breaking and surf zone circulation

Tides and other long waves

Port facilities

Dedication

3.0h. Theory

Description

Design and operation of seaports

Port installations

Rubble mound Breakwaters

Dedication

5.0h. Theory + 1.0h. Laboratory

Description

Basic concepts and design parameters

Wave-structure interaction

Construction procedures

Maintenance and Monitoring

Vertical breakwaters

Dedication

4.0h. Theory + 1.0h. Laboratory

Description

Basic concepts and design parameters

Construction procedures

Maintenance and monitoring

Coastal dynamics & coastal zone management

Dedication

3.0h. Theory + 1.0h. Assignments + 1.0h. Laboratory

Description

Sediment transport

Shoreline and beach profile evolution

Coastal management

Coastal erosion

Rigid coastal protection works

Dedication

3.0h. Theory + 3.0h. Assignments + 1.0h. Laboratory

Description

Shore-normal structures. Groynes

Shore-parallel structures. Detached breakwaters

Shore-parallel structures at land. Seawalls and revetments

Stability of protection works in the Catalan coast

Beach nourishment and sediment management

Dedication

3.0h. Theory + 2.0h. Assignments + 1.0h. Laboratory

Description

Basic concepts and design parameters

Design and execution of beach nourishment works

Design and execution of by-pass

Beach nourishment on the Catalan coast

Outfalls

Dedication

1.0h. Theory + 2.0h. Assignments

Description

Basic concepts and design parameters

Outfalls

Activities

Construction of coastal protection works

Dedication

4.5 h. Supervised activities

Description

Given a problem of coastal erosion, making the pre-design a piece of protection (depending on the type of problem and carcaterísticas the site.) Choose and detail the method of construction and planned maintenance. Estimate the potential impact.

Grading rules

The rating of the course is obtained from a system of continuous assessment which includes conducting a series of tests and a set of practices.

Continuous assessment includes the completion of three exams during the semester to help with a weight of 60% in the final and the completion of a set of practices of different issues that contribute to the remaining 40%.

Criteria for re-evaluation qualification and eligibility: Students that failed ordinary evaluation and have been regularly attending tests throughout the course will have the option to perform a re-evaluation test during the period specified in the academic calendar. The highest mark for the subject in the case of attending the evaluation exam will be five. In the case of justified absences to the regular evaluation tests that prevent the assessment of some parts of the contents of the subject, with prior approval of the Head of Studies, students may get evaluated by the re-evaluation test of the contents that have not been previously examined as well as the contents whose tests students have failed. The limitation on the maximum mark shall not apply to the parts assessed for the first time.

Test rules

Failure to perform a laboratory or continuous assessment activity in the scheduled period will result in a mark of zero in that activity.

Teaching methodology

The course consists of 3 (2 +1) hours per week of classes in a classroom.

In the lectures the teacher explains the concepts and basic materials of the topic, he presents examples and exercises.

In the practical classes are problem-solving approaches with greater interaction with students. Practical exercises to consolidate learning objectives.

It uses material support in the form of detailed teaching plan using the virtual campus ATENEA: content, scheduling of activities and a learning assessment and bibliography.

Office hours

Schedule consultation agreed with professors of the subject

Basic bibliography

- Bruun, P. **Port engineering**. Gulf. Houston, TX. 1989-1990. ISBN 0872018423 (O.C.).
- Morang, A. [et al.]. **Coastal engineering manual**. US Army Corps of Engineers. Washington. 2003.

- CIRIA; CUR. **Manual on the use of rock in coastal and shoreline engineering.**. CIRIA/CUR. London : Gouda. 1991. ISBN 0860173267.
- Dean, R.G. **Beach nourishment: theory and practice**. World Scientific Press. New Jersey. 2002. ISBN 9810215487.
- Pilarczyck, K.W. (ed.). **Dikes and revetments: design, maintenance and safety assessment** . A.A.Balkema. Rotterdam. 1998. ISBN 9054104554.
- Herbich, J.B. (ed.). **Handbook of coastal engineering**. McGraw Hill. New York. 2000. ISBN 0071344020.
- Tsinker, G.P. **Handbook of port and harbor engineering: geotechnical and structural aspects**. Chapman & Hall. New York. 1997. ISBN 0412087014.
- Ministerio de Fomento-Puertos del Estado. **ROM 4.1-94. Recomendaciones para el Proyecto y Construcción de Pavimentos Portuarios**.
- Ministerio de Fomento-Puertos del Estado. **ROM 05-94. Recomendaciones geotécnicas para Obras Marítimas.**.
- Kamphuis, J.W. **Introduction to coastal engineering and management**. World Scientific. Singapore. 2010. ISBN 9789812834843.

Complementary bibliography

- Herbich, J. . **Handbook of Dredging Engineering**. McGraw Hill. 1992.
- Kim, Y.C.. **Handbook of Coastal and Ocean Engineering**. World Scientifc. 2008.
- Ministerio de Fomento - Puertos del Estado. **ROM 1.0-09. Recomendaciones del diseño y ejecución de obras de abrigo. Parte I: bases y factores para el proyecto. Agentes climáticos**. 2009.
- Cruickshank, I. & Cork, S.. **Construction health and safety in coastal and maritime engineering**. Thomas Telford. 2005.
- Crossman, M. & Simm, J.. **Manual on the use of timber in coastal and river engineering**. Thomas Telford. 2004.
- Simm, J. & Masters, N.. **Whole life costs and project procurement in port, coastal and fluvial engineering: how to escape the cost boxes**. Thomas Telford. 2003.
- Allen, R.T.L.. **Concrete in coastal structures**. Thomas Telford. 1998.