Course guide
250264 - IMPAMBOM - Environmental Impact in Maritime Works

Last modified: 01/10/2023

Unit in charge: Barcelona School of Civil Engineering
Teaching unit: 751 - DECA - Department of Civil and Environmental Engineering.

Degree: BACHELOR'S DEGREE IN PUBLIC WORKS ENGINEERING (Syllabus 2010). (Optional subject).

Academic year: 2023 **ECTS Credits:** 4.5 **Languages:** English

LECTURER

Coordinating lecturer: IVAN CACERES RABIONET

Others: IVAN CACERES RABIONET, QUERALT GUERRERO SANCHEZ, JOSE LUIS MONSO DE PRAT, OCTAVIO CESAR MÖSSO ARANDA

DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

Generical:
3105. 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.
3106. 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.
3107. 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.
3111. 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.
3112. 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.
3113. 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.

Transversal:
586. 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.
589. SUSTAINABILITY AND SOCIAL COMMITMENT - Level 2. Applying sustainability criteria and professional codes of conduct in the design and assessment of technological solutions.
594. 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.
584. THIRD LANGUAGE. Learning a third language, preferably English, to a degree of oral and written fluency that fits in with the future needs of the graduates of each course.

TEACHING METHODOLOGY

The course consists of 3 hours per week of classroom activity (large size group) and 0,6 hours weekly with half the students (medium size group).

During the theoretical lectures, the teacher presents the basic concepts and topics of the subject, shows examples and solves exercises.

During the practical lectures, the teacher will help 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

Capacity for contrucción and conservation of maritime works.
Understanding of climate-wind-wave-coast interaction and of the conditionings that imposes to the maritime works.

Itinerary in hydrology

Development to level of specialization of the basic concepts purchased of engineering of ports and coasts in the subject precedent on technologies of the water.

The main objective of this course is to introduce students in the knowledge of the major environmental aspects related to the maritime works (works of defence of coast, and submarine outfalls) from two points of view: (i) the impact on the physical environment generated by these works and (ii) issues related to the quality of coastal waters, instilling him at all times the environmental importance of the territory which will develop its engineering activity. Expected that the student acquires a knowledge of:
(i) the basis governing the functional design of the main works of coastal protection, as well as the basics of coastal Dynamics to assess the interaction with the engineering works in the coastal area (physical impacts on the adjacent coast).

(ii) the main physical processes that control the quality of coastal waters as well as the main impact of this due to maritime works (this section includes the design of submarine outfalls and accidental processes). At the end of the course students should have basic knowledge of the marine environment, environmental conditions, hydrodynamics, coastal (in response to the forcing of the tide, the waves and the wind), evaluation of the transport (of water and sediments), the expected response of shoreline in the presence of structures, processes of dispersion of pollutants and nutrients and basic aspects of the quality of coastal and port waters. Therefore students will have the capacity of: 1. projecting the functional design of a coastal protection structure depending on the problem and the dominant forcing mechanisms on the coast. 2. Optimize the interaction between coastal defences and the physical environment while minimizing environmental impact.

STUDY LOAD

Type	Hours	Percentage
Hours large group	18,0	16.00
Guided activities	4,5	4.00
Hours medium group	18,0	16.00
Hours small group	9,0	8.00
Self study	63,0	56.00

Total learning time: 112.5 h

CONTENTS

1.- Description of subject

Description:
Proceed

Specific objectives:
Basic objectives of the course, approach and presentation of the work to develop during the course. Definition of problem (vs. processes * problems) and impact. Definition of the coastal area as a multi-component (physical, ecological and socio-economic). Concept of temporal and spatial scales for the definition of processes, problems and solutions. Basic types of coastal problems and conceptual solutions.

Full-or-part-time: 4h 48m
Theory classes: 2h
Self study : 2h 48m

2.- Physical processes in the nearshore zone

Description:
Review of relevant physical processes more about the environmental impact of coastal protection structures
Description of physical processes around

Specific objectives:
Morphodynamic processes that control the impact of coastal engineering works. Agents promoters. Sediment transport. Coastal evolution.
* Processes that control the impact of the morphodynamics of coastal engineering works. Agents promoters. Sediment transport. Coastal evolution.

Full-or-part-time: 12h
Theory classes: 3h
Practical classes: 2h
Self study : 7h

3.- Cross-shore structures

Description:
Objectives of this type of work and basic design criteria. Potential impacts and basic solutions.
Impact of the breakwaters on the marine environment
Impact of the breakwaters on the marine environment

Specific objectives:
Objectives of this type of work and basic design criteria. Potential impacts and basic solutions.
Objectives of this type of work and basic design criteria. Potential impacts and basic solutions.
Objectives of this type of work and basic design criteria. Potential impacts and basic solutions.

Full-or-part-time: 14h 23m
Theory classes: 2h
Practical classes: 1h
Laboratory classes: 3h
Self study : 8h 23m

4.- Longshore structures

Description:
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Descr
Impact of dams exempt on the marine environment

Specific objectives:
of
Objectives of this type of work and basic design criteria. Potential impacts and basic solutions.
Objectives of this type of work and basic design criteria. Potential impacts and basic solutions.

Full-or-part-time: 14h 23m
Theory classes: 2h
Practical classes: 1h
Laboratory classes: 3h
Self study : 8h 23m

5. - Lonsghore structures on the beach

Description:
Impact of dams exempt on the marine environment.
ADF

Specific objectives:
Objectives of this type of work and basic design criteria. Potential impacts and basic solutions.
Objectives of this type of work and basic design criteria. Potential impacts and basic solutions.

Full-or-part-time: 7h 11m
Theory classes: 2h
Laboratory classes: 1h
Self study : 4h 11m

Exam

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

6.- Harbour impacts

Description:
. Approach the problem. Impacts associated with water quality. Impacts associated with the interaction with the coast. Basic solutions.

Specific objectives:
Approach the problem. Impacts associated with water quality. Impacts associated with the interaction with the coast. Basic solutions.

Full-or-part-time: 7h 11m
Theory classes: 3h
Self study : 4h 11m

7.- Dredging Impacts

Description:
Type of dredging. Characteristics of dredged material. Mining areas and deposits. Physical impact. Ecological impact. Impact on water quality. Basic solutions.

Specific objectives:
Type of dredging. Characteristics of dredged material. Mining areas and deposits. Physical impact. Ecological impact. Impact on water quality. Basic solutions.

Full-or-part-time: 7h 11m
Theory classes: 3h
Self study : 4h 11m

8.- Beach nourishment impacts

Description:
Impacts of beach regeneration in the marine environment

Specific objectives:
Works supply and regeneration of beaches. Type of food. Ecological impact. Effect on water quality.

Full-or-part-time: 7h 11m
Theory classes: 3h
Self study : 4h 11m

9.- Processes that control water quality associated with coastal works

Description:
Review of the main processes associated with the dispersion in the marine environment
Review of the main processes associated with the dispersion in the marine environment

Specific objectives:
Processes that control water quality associated with coastal works. Agents promoters. * Advection-diffusion processes. Pollutants. Description Review of the main processes associated with the dispersion medium maríObjectius processes that control water quality associated with coastal works. Agents promoters. Advection-diffusion processes. Pollutants.

Full-or-part-time: 12h
Theory classes: 3h
Practical classes: 2h
Self study : 7h

10.- Emissaries submarines

Description:
Impacts of the emissaries and versed
Impacts of the emissaries and the waste dumped in the sea of aiguas

Specific objectives:
Emissaries submarines. Objectives of this type of work and basic design criteria. Potential impacts and basic solutions.
Description of Impacts and emissaries of the dumped waste into the environment aiguas maríObjectius Emissaries submarines. Objectives of this type of work and basic design criteria. Potential impacts and basic solutions.

Full-or-part-time: 12h
Theory classes: 3h
Practical classes: 2h
Self study : 7h

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 grade of teaching at the field is the average in such activities.

The course is divided into two main groups. The first has to do with the environmental impact of maritime coastal protection works , and the second , with port maritime works , and the dispersion of pollutants . Each block is evaluated separately , through an examination and work / individual practice (which contributes with 35% 15 % of the grade of each block respectively) and the final grade will result from the sum of both assessments. 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.

Criteria for re-evaluation qualification and eligibility: Students that failed the ordinary evaluation and have regularly attended all evaluation tests will have the opportunity of carrying out a re-evaluation test during the period specified in the academic calendar. Students who have already passed the test or were qualified as non-attending will not be admitted to the re-evaluation test. The maximum mark for the re-evaluation exam will be five over ten (5.0). The non-attendance of a student to the re-evaluation test, in the date specified will not grant access to further re-evaluation tests. Students unable to attend any of the continuous assessment tests due to certifiable force majeure will be ensured extraordinary evaluation periods.

These tests must be authorized by the corresponding Head of Studies, at the request of the professor responsible for the course, and will be carried out within the corresponding academic period.

EXAMINATION RULES.

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

BIBLIOGRAPHY

Basic:

- Komar, P.D. Beach processes and sedimentation. 2nd ed. Upper Saddle River, N.J: Prentice Hall, 1998. ISBN 0137549385.
- Pilarczyk, K.W. Coastal protection : proceedings of the Short course on coastal protection. Rotterdam [etc.]: AA Balkema, 1990. ISBN 9061911273.
- Morang, A. [et al.]. Coastal engineering manual [on line]. Washington: US Army Corps of Engineers, 2003 [Consultation: 02/02/2021]. Available on: http://www.a-jacks.com/Coastal/GeneralInfo/CEM/CEM.aspx.
- Doerffer, J.W. Oils spill response in the marine environment. Oxford [etc]: Pergamon Press, 1992. ISBN 0800410006.
- Lewis, R. Dispersion in estuaries and coastal waters. Chochester [etc.]: John Wiley and Sons, 1997. ISBN 0471961620.
- Herbich, J.B. (Ed.). Handbook of coastal engineering. New York: McGraw Hill, 2000. ISBN 0071344020.