Course guide
250264 - IMPAMBOM - Environmental Impact in Maritime Works

Last modified: 02/07/2024

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: 2024 **ECTS Credits:** 4.5 **Languages:** English

LECTURER

Coordinating lecturer: IVAN CACERES RABIONET

Others: Iván Caceres Rabionet, Jose Luis Monso De Prat

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.

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:
The main objectives and topics of the subject will be described

Specific objectives:
Basic objectives of the subject, approach and presentation of the work to be developed during the subject. Definition of the concept of problem (processes vs. problems) and impact. Definition of the coastal zone as a multi-component system (physical, ecological and socio-economic). Concept of temporal and spatial scales for the definition of processes, problems and solutions. Basic typology of coastal problems and conceptual solutions. Underwater outfalls. Objectives of this type of works and basic design criteria. Possible impacts and basic solutions. Impacts of outfalls and the discharge of waste water in the marine environment.

Full-or-part-time: 6h 49m
Theory classes: 2h
Practical classes: 1h
Self study : 3h 49m

2.- Physical processes in the nearshore zone

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

Specific objectives:
Processes that control the morphodynamic impact of coastal engineering works. driving agents Coastal Hydrodynamics, Sediment Transport. Coastal development.

Full-or-part-time: 13h 38m
Theory classes: 4h
Practical classes: 2h
Self study : 7h 38m

3.- Long-shore structures

Description:
Impact of sea walls, revetments and Low Crested Structures on the Coastal Marine Environment.

Specific objectives:
Objectives of this type of works and basic design criteria. Possible impacts and basic solutions.

Full-or-part-time: 13h 38m
Theory classes: 4h
Practical classes: 2h
Self study : 7h 38m

4.- Cross-shore structures

Description:
Impact of breakwaters and jetties on the coastal marine environment

Specific objectives:
Objectives of this type of works and basic design criteria. Possible impacts and basic solutions.

Full-or-part-time: 6h 49m
Theory classes: 2h
Practical classes: 1h
Self study : 3h 49m

5.- Field Trip

Description:
Field trip

Full-or-part-time: 13h 38m
Laboratory classes: 6h
Self study : 7h 38m

6.- Harbour impacts

Description:
Impact of port facilities on the marine environment

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

Full-or-part-time: 9h 05m
Theory classes: 3h
Practical classes: 1h
Self study : 5h 05m

7.- Dredging Impacts

Description:
Impact of dredging works on the marine environment

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: 9h 05m
Theory classes: 3h
Practical classes: 1h
Self study : 5h 05m

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: 9h 05m
Theory classes: 3h
Practical classes: 1h
Self study : 5h 05m

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

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

Specific objectives:
Processes that control the quality of water associated with coastal works. driving agents Diffusion-advection processes. Pollutants.

Full-or-part-time: 9h 05m
Theory classes: 3h
Practical classes: 1h
Self study : 5h 05m

10.- Underwater outfalls

Description:
Impacts of outfalls and the discharge of waste water in the marine and coastal environment

Specific objectives:
Objectives of this type of works and basic design criteria. Possible impacts and basic solutions.

Full-or-part-time: 9h 05m
Theory classes: 3h
Practical classes: 1h
Self study : 5h 05m

GRADING SYSTEM

The qualification of the subject is obtained from the continuous evaluation grades and the evaluations in the field trips and/or computer classroom.
The continuous assessment consists of different activities, both individual and group, of an additive and formative nature, carried out during the course (inside and outside the classroom).
The course is divided into two large blocks. The first has to do with the environmental impact of maritime coastal protection works, while the second one deals with maritime port works and the dispersion of pollutants. Each block scores 50% of the final grade and this will be the average of both assessments. The assessment tests for each block are independent and consist within the first block of a field trip document that is completed at the end of the trip plus a document to be handed in about a study area applying the concepts learned. In the case of the second block, the assessment will consist of the written presentation plus exposition of a work related to the questions and concepts associated with the learning objectives of this block.
The grade for the subject will consist of:
First partial/block
- Document at the field trip (DSC). Scores 20% of the final grade
- Study Zone Work (TZE). Scores 30% of the final grade
Second partial/block
- Work and exhibition (TE). Scores 50% of the final grade

The Final Grade (NF) of the subject will be:
Final Grade = 0.20*DSC + 0.30*TZE + 0.5 TE

Criteria for qualification and admission to the reassessment:
Students who have failed the regular assessment and who have submitted the requested documents corresponding to each partial/block will have the option to take a reassessment test in the period set in the academic calendar. Students who have already passed it or students classified as not present (who have not completed any of the two part-time assignments) will not be able to take the re-evaluation test of a subject. The maximum grade in the case of taking the re-evaluation exam will be five (5.0). The non-attendance of a student called to the re-evaluation test, held in the fixed period, cannot give rise to another test with a later date. Extraordinary assessments will be carried out for those students who, due to accredited force majeure, have not been able to take any of the continuous assessment tests.
These tests must be authorized by the corresponding head of studies, at the request of the teacher responsible for the subject, and will be carried out within the corresponding teaching period.

EXAMINATION RULES.

If one of the continuous assessment activities is not carried out in the scheduled period, it will be considered as a zero score. The tests will be carried out individually, with questions that can be developed by the students, test type or solution of exercises to be solved.
During the first 15 minutes of the official start time of the exam, students will be able to access the classroom, without this implying an increase in the time set to take the exam, unless there is a delay attributable to the University. Once the exam has started, no student will be allowed to leave the classroom until 15 minutes have passed since the start of the test. After this time (15 min) new students will no longer be accepted for the test and those who wish may leave the classroom after taking the exam.

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.
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