

Project Design and Evaluation in Engineering and Marine Sciences (250586)

General Information

School	ETSECCPB
Departments	Departament d'Enginyeria Civil i Ambiental (DECA) Laboratori d'Enginyeria Marítima (LIM)
Credits	6.0 ECTS
Programs	GRAU EN CIÈNCIES I TECNOLOGIES DEL MAR (pla 2018)
Course	2024/25

Main teaching language at each group

- Group 10CA1 Catalan (Q1)

Faculty

Responsible Faculty: Daniel Gonzalez Marco

Faculty: Corrado Altomare, Daniel Gonzalez Marco, Jose Luis Monso De Prat, Xavier Pascual Lorente

Objectives of Education

This subject will consist in showing the students the fundamental aspects that must be considered for the planning, elaboration and execution of a consultancy work, scientific research or industrial project, and which can be applied to the preparation of their end of degree work. Emphasis will be placed on formal aspects of a project design and the definition of its structure, as well as its communication and defense.

1. Evaluate the life cycle of engineering and marine science projects. Identify problems and approach alternatives.
2. Know the construction of the cash flows for the realization of investments and the control of the subsequent operational costs.
3. Perform a risk analysis to reduce the uncertainty of the project.

The topics addressed in this matter cover most of the physical, environmental and ecological problems and challenges identified by the scientific community and the social agents that the coastal zone will face in the near future under different development scenarios and climate change.

1. Introduce students to the scheme and tools for designing, developing, evaluating and managing projects, both for interventions in the marine / coastal environment and for research and development of tools to support these projects.
2. Analyze the different dimensions of the projects, structured by their life cycle and considering material resources, human resources and financial management.
3. To provide students with a global vision of the different administrations - local, regional, state, European, international - participants / financiers of the projects, and the relationship and interrelation with them and between them.
4. Apply the tools presented during the course to projects of actions in the marine and coastal environment.
5. Apply the tools presented during the development of the course to support and research projects.
6. Enhance the ability of students to integrate the different components needed for multidisciplinary projects, necessary for marine sciences and technologies.

Competencies

Especific

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To know and apply the lexicon and concepts of the Marine Sciences and Technologies and other related fields.

Establish a good practice in the integration of common numerical, laboratory and field techniques in the analysis of any problem related to the marine environment.

Participate and eventually lead multidisciplinary work teams in the field of Marine Sciences and Technologies to respond to the social challenges related to this field.

Evaluate the dynamics of seas and oceans at different scales, identifying water masses and their properties. (Specific competence of Marine Science and Engineering Mention)

To set, analyze and optimize the functionality of actions and infrastructures in the marine environment. (Specific competence of the Marine Science and Engineering Mention)

Carry out operational predictions in the open sea and coastal areas, including the corresponding risk maps. (Specific competence of the Marine Science and Engineering Mention)

Use state-of-the-art mathematical models in the marine field to analyze impacts and interactions with socio-economic activities supported by this environment. (Specific competence of the Marine Science and Engineering Mention)

Develop a conceptual framework to address the sustainability of the marine environment and the related socio-economic activities at different scales, explaining the effects of climate change.

Set, plan and execute basic and applied research in the field of Marine Sciences and Technologies.

Carry out calculations, assessments, surveys and inspections in coastal and marine environments, as well as the corresponding technical documents.

Write technical reports and disseminate knowledge about the different components of the marine system, considering the applicable legal framework.

Apply the necessary tools to analyze the economic and legal aspects of human actions and the related impacts on the marine environment, including technical advice and representation of companies and administrations.

Generic

Develop a conceptual framework that links the scientific-technological and management aspects for marine resources, explaining the interactions with marine infrastructures and management plans in coastal areas. Encompass and teach studies in the different research lines that converge in Marine Sciences and Technologies.

Combining preservation with economic activity within the framework of current legislation promoting the development of a social and environmental awareness.

Total hours of student work

		Hours	Percentage
Supervised Learning	Large group	30.0 h	50.00 %
	Medium group	15.0 h	25.00 %
	Laboratory classes	15.0 h	25.00 %
	Guided Activities	0.0 h	0.00 %
Self Study		90.0 h	

Contents

1. Introduction and approach. Contents and teachers

Introduction of the contents Approach of the subject List of teachers Master classes

Specific Objectives

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

2. Project management

Projects in Engineering and Marine Sciences. Actions and Research Project design Project evaluation The role of the project manager Group communication Methodologies to reduce project risks
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Specific Objectives

The main objective is to address the general features of the design and evaluation of applied projects and research in engineering and marine sciences, emphasizing the role of the project manager, communication, associated risks, etc.

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3. The life cycle of the project

Phases of the project: from idea to execution Criteria, requirements and objectives Strategy for solving problems Compatible solutions Multi-criterion analysis Justifications

5. The life cycle of the project

Specific Objectives

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

4. Planning during the life cycle of the project

Project planning Time management Gantt chart PERT method

7. Planning during the project life cycle

Specific 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 time management. Introduction to Gantt charts and PERT method.

5. Information management

Sources of information Resources Communication Uncertainty management Risk control

9. Information management

Specific Objectives

The main goal is to present the sources of information, how to manage it, what resources are available including communication tools. However, uncertainties and their management will be addressed, as well as tools and methodologies for controlling risks.

6. Material resources

Multidisciplinary teams in marine sciences. Conditions for success and added value. Stages for effective management Rules of behavior

11. Material resources

Specific Objectives

The main objective is to address the existing bases in terms of material resources, multidisciplinary, organization and necessary HR structure.

7. The financial management of the project

Basic concepts of economics The viability of projects Investments in sustainability Financial criteria such as IRR and NPV

13. The financial management of the project

Specific Objectives

The main objective is to present the tools for the effective financial management of applied and research projects in engineering and marine sciences. It will address the criteria of viability, investments in sustainability, as well as the main financial criteria.

8. Public and private funding

Areas of financing Types of financing Sources of financing Cost-benefit analysis Multi-criterion analysis Projects of actions in the maritime and coastal zone

15. Public and private funding

Specific Objectives

The main objective is to present the multiple sources, areas and types of funding, both public and private, to successfully address applied and research projects in engineering and marine sciences.

9. Economic and social effects

Projects and society Research and society Citizen science Impact and social return Circular economy

Specific Objectives

The main objective is to present the effects and repercussions of the projects to society, both applied and research. Introduction to citizen science and the circular economy.

10. Generated data management plan and dissemination

Data management plan Results dissemination and dissemination plan Communication

10. Generated data management plan and dissemination

Specific Objectives

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

11. Intellectual, industrial, responsibility and ethical property

Intellectual property Industrial property Royalties Patents Liability Ethics in management

20. Intellectual, industrial property, responsibility and ethics

Specific Objectives

The main objective is to make known the concepts of intellectual and industrial property, how they are managed, what responsibilities they become, as well as ethics throughout the project management process.

12. Course work

Course work

Specific Objectives

Apply the concepts and tools developed to plan and manage a project, both actions and support, structuring the contributions of students so that among all projects cover: a) the maritime area, b) the land area and c) the sea-land area and its connectivity.

Activities

1. Project management at different scales.

Compatibility and development control. (Management of the UPC)

Dedication

2h

2. The critical path of the project

The methodology of the critical path. Project control

Dedication

2h

3. The role of the evaluator

Criteria, responsibility and ethics

Dedication

2h

Teaching Methodology

The course consists of 2.3 hours per week of classroom activity (large size group) and 1.2 hours weekly with half the students (medium size group).

The 2.3 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 1.2 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.

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

Through continuous assessment during the course and the presentation of a team course work

Office Hours

To be determined with the students

Bibliography

Basic

- Intergovernmental Panel on Climate Change. Climate change 2022 : mitigation of climate change. IPCC, ISBN 978-92-9169-160-9.

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