

# Course guide

## 280676 - 280676 - Ship and Naval Artifact Design

**Last modified:** 25/10/2023

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| <b>Unit in charge:</b>     | Barcelona School of Nautical Studies   |                           |
| <b>Teaching unit:</b>      | 742 - CEN - Department of Nautical Sciences and Engineering.   |                           |
| <b>Degree:</b>             | BACHELOR'S DEGREE IN NAVAL SYSTEMS AND TECHNOLOGY ENGINEERING (Syllabus 2010). (Compulsory subject). |                           |
| <b>Academic year:</b> 2023 | <b>ECTS Credits:</b> 9.0   | <b>Languages:</b> Spanish |

### LECTURER

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| <b>Coordinating lecturer:</b> | INMACULADA ORTIGOSA BARRAGÁN   |
| <b>Others:</b>                | Primer quadrimestre:<br>INMACULADA ORTIGOSA BARRAGÁN - DT, GESTN, MUENO<br>PAU TRUBAT CASAL - DT, GESTN, MUENO |

### TEACHING METHODOLOGY

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The teaching methodology will be based on an equal mixture of classical teaching of theoretical concepts and project-based learning. Project-based learning will be mainly developed through workshops based on real or theoretical projects. The students will be distributed in various working groups with specific responsibilities, acting as technical office departments, which must develop the project jointly.

Thus, classes are organized as coordination meetings, led by the teacher, in which the different groups to exchange information and experiences, and solve the problems and doubts found. In addition to the coordination meetings, the different groups that will be assigned a responsible, will share and exchange information through cloud-based systems.

Prior to conducting the above mentioned workshops, different teacher-led practices will be carried out, focused on reviewing the different matters that make up the areas of ship design covered in the course.

### LEARNING OBJECTIVES OF THE SUBJECT

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- Know, understand and apply the methods of design of ships and artifacts.
- Use knowledge and strategic skills to the creation and management of projects with innovative vision, apply systematic solutions to complex problems.
- Apply sustainability criteria and rules in the design and assessment of technological solutions.
- Identifies the need to apply legislation, regulations and policy.
- Meet the concept of life cycle of a product and to be applied to the development of products and services in the field of naval architecture and marine engineering, using the appropriate regulations and legislation.
- Plan and use the information needed for a project or scholar work from a critical appraisal of the information resources used.
- Perform the tasks on schedule, according to the guidelines set by the teacher. Identifies progress and degree of compliance with the learning objectives.
- Performs tasks based on the guidelines set by teachers, deciding the time and resources required. Assesses his/her own strengths and weaknesses and acts accordingly.
- Identify user needs and develops a definition of product-process-service and initial specifications. Follow a management model of the design process based on standards. Assesses the implementation of legislation and regulations.



## STUDY LOAD

| Type               | Hours | Percentage |
|--------------------|-------|------------|
| Hours large group  | 40,0  | 17.78      |
| Hours medium group | 10,0  | 4.44       |
| Guided activities  | 40,0  | 17.78      |
| Self study         | 135,0 | 60.00      |

**Total learning time:** 225 h

## CONTENTS

### Section 1. Project of the ship

**Description:**

Introduction. Phases of the project of the ship. Cycle of the ship project. Basic principles governing the project of the ship. Conceptual project and specifications. Dimensioning. Contracting project. Design recommendations. Conclusions.

**Related activities:**

Practice on the dimensioning of the vessel.

**Full-or-part-time:** 30h

Theory classes: 6h

Guided activities: 4h

Self study : 20h

### Section 2. Hull shape design

**Description:**

Introduction. Shape design. Shape parameters. Criteria for hull shape design. Shape definition. Technical evaluation. Evaluation of the ship drag. Selection of the main engine. Conclusions.

**Related activities:**

Practice on the design of the hull shape. Design competition (workshop).

**Full-or-part-time:** 41h

Theory classes: 8h

Practical classes: 4h

Guided activities: 4h

Self study : 25h

### Section 3. General arrangement

**Description:**

Introduction. Disposition of transversal and longitudinal elements. Spacing. Distribution of volumes. Regulations. Conclusions.

**Related activities:**

Practices on general arrangement of the ship.

**Full-or-part-time:** 14h

Theory classes: 6h

Guided activities: 3h

Self study : 5h



#### Section 4. Structural design and calculation of displacement

**Description:**

Introduction. Selection of the type of structure. Regulations. Spacing of the transverse or longitudinal elements. Form and structure of bulkheads and decks. Reminder of structural analysis. Calculation of the structure. Minimizing the weight of steel. Estimate the weight of steel and displacement. Conclusions.

**Related activities:**

Practices on the design and verification of the longitudinal structure of the ship. Practices on the estimation of the weight of steel.

**Full-or-part-time:** 27h

Theory classes: 8h

Guided activities: 4h

Self study : 15h

#### Section 5. Stability, maneuverability and seakeeping

**Description:**

General introduction and review of the main concepts of stability. Intact and damage stability assessment. Applicable regulations. Calculation of the vessel stability.

General introduction and review of the main concepts of maneuverability. Criteria for assessment the maneuverability of the vessel. Applicable regulations. Dimension of the steering system.

General introduction and review of the main concepts of seakeeping. Basic theoretical review of the seakeeping. Assessment criteria for seakeeping of ships and offshore platforms.

**Related activities:**

Practice on intact stability assessment. Practice on dimension of the steering system. Practice on assessment of the seakeeping criteria. Practice on seakeeping analysis of an offshore platform.

**Full-or-part-time:** 41h

Theory classes: 9h

Practical classes: 2h

Guided activities: 5h

Self study : 25h

#### Section 6. Tonnage Measurement and freeboard

**Description:**

Introduction. Review of the International Convention on Tonnage Measurement of Ships. Review of the International Convention on Load Lines.

**Related activities:**

Practical exercises.

**Full-or-part-time:** 9h

Theory classes: 2h

Guided activities: 2h

Self study : 5h



## Section 7. Final workshop

### Description:

Introduction. Workshop on the project of a ship.

### Related activities:

Workshop in working groups on the project of the ship.

### Full-or-part-time: 63h

Theory classes: 1h

Practical classes: 4h

Guided activities: 18h

Self study : 40h

## GRADING SYSTEM

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The final mark will be the weighted average of all the different evaluating activities in the subject:

$$N_{\text{final}} = 0.60 \cdot N_{\text{ec}} + 0.40 \cdot N_{\text{ex}}$$

$N_{\text{final}}$ : final mark

$N_{\text{ec}}$ : mark of the different exercises and practices

$N_{\text{ex}}$ : mark of the exam

The re-evaluation will consist on carrying out a practical exercise defined by the professors. This work will be focused on the aspects of the matter failed by the student. The student will be required to deliver a written report on the work at the day of the exam. Furthermore, the student could be asked for an oral presentation or written exam on the work.

## EXAMINATION RULES.

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The student not presenting to any evaluation act will be qualified as "not taken"

## BIBLIOGRAPHY

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