



Course guide

280802 - 280802 - Engineering for Ship and Ocean Systems

Last modified: 27/05/2025

Unit in charge: Barcelona School of Nautical Studies

Teaching unit: 742 - CEN - Department of Nautical Sciences and Engineering.

709 - DEE - Department of Electrical Engineering.

Degree: MASTER'S DEGREE IN NAVAL AND OCEAN ENGINEERING (Syllabus 2017). (Compulsory subject).

Academic year: 2025 **ECTS Credits:** 5.0 **Languages:** Catalan, Spanish

LECTURER

Coordinating lecturer: ERIC JOSE PASCUAL SOLDEVILLA

Others: Primer quadrimestre:

ERIC JOSE PASCUAL SOLDEVILLA - MUENO

VICENÇ RODRIGUEZ BARRAGUER - MUENO

PRIOR SKILLS

Specifics:

Capacity in: Systems Engineering and Naval Technology.

Apply multidisciplinary knowledge through study, experience and practice, with critical reasoning, to establish viable solutions to technical problems

Generals:

Knowledge of the facilities and their environment on board.

Capacity of detailed project according to the applicable regulations

DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

Specific:

MUENO_CE1. Ability to design ships suitable for the needs of the maritime transport of people and goods, and those of maritime defense and security

MUENO_CE3. Knowledge of the dynamics of the ship and of the naval structures, and ability to perform optimization analysis of the structure, the integration of the systems on board, and the behavior of the ship at sea and its maneuverability

MUENO_CE4. Ability to analyze alternative solutions for the definition and optimization of power plants and ship propulsion

MUENO_CE7. Ability to project ocean platforms and artifacts

MUENO_CE11. Knowledge of the specific operations and systems of fishing boats and the ability to integrate them into the projects of said boats



General:

MUENO_CG2. Ability to conceive and develop solutions that are technically, economically and environmentally appropriate to the needs of maritime or integral transportation of people and goods, of the use of oceanic resources and of the marine subsoil (fishing, energy, minerals, etc.), adequate use of the marine habitat and means of defense and maritime security)

MUENO_CG4. Capacity for the project of platforms and artifacts for the use of ocean resources

MUENO_CG5. Ability to design and control the construction, repair, transformation, maintenance and inspection processes of previous mills

MUENO_CG6. Ability to conduct research, development and innovation in naval and ocean products, processes and methods

MUENO_CG7. Ability to integrate complex maritime systems and translation into viable solutions

MUENO_CG8. Ability to analyze and interpret measurements, calculations, evaluations, appraisals, studies, reports, work plans and other similar works

MUENO_CG13. Ability to develop the necessary engineering in rescue and rescue operations and in the design and use of the required means

MUENO_CG14. Ability to analyze, assess and correct the social and environmental impact of technical solutions

MUENO_CG15. Ability to organize and direct multidisciplinary work groups in a multilingual environment, and to generate reports for the transmission of knowledge and results

Transversal:

CT2. SUSTAINABILITY AND SOCIAL COMMITMENT: Know and understand the complexity of economic and social phenomena typical of the welfare society, being able to relate welfare to globalization and sustainability; acquire skills to use in a balanced manner compatible technology, technology, economics and sustainability.

CT3. TEAMWORK: Ability to work as a member of an interdisciplinary team, either as a member or performing management tasks, with the aim of contributing to projects pragmatically and sense of responsibility, assuming commitments considering the resources available.

CT4. EFFECTIVE USE OF INFORMATION RESOURCES: Manage the acquisition, structuring, analysis and visualization of data and information in the field of specialty, and critically evaluate the results of this management.

CT5. THIRD LANGUAGE Learning a third language, preferably English, with adequate oral and written and in line with the future needs of the graduates.

Basic:

CB6. Possess knowledge and understanding that provide a basis or opportunity be original in the development and / or application of ideas, often in a research context.

CB7. That the students can apply their knowledge and ability to solve problems in new or unfamiliar environments within broader (or multidisciplinary) contexts related to their study area.

CB8. Students should be able to integrate knowledge and handle the complexity of making judgments based on information that, being incomplete or limited, includes reflections on the responsibilities social and ethical linked to the application of their knowledge and judgments.

CB9. That students can communicate their conclusions and the knowledge and Latest rationale underpinning to specialists and non Specialty clearly and unambiguously.

CB10. Students must possess the learning skills that enable them continue studying in a way that will be largely self-directed or autonomous.

TEACHING METHODOLOGY

Classroom sessions:

Master and participatory classes. Explanation of basic concepts and calculation methods on different systems.

Team work:

Development of a work on specific systems on board that involves searching for information, regulations, analysis, plans, jobs. Elaboration of concrete projects.

LEARNING OBJECTIVES OF THE SUBJECT

Acquire skills in the management, interpretation and execution of engineering projects applied to platforms and ships.

Increase the skills of autonomous learning to maintain and improve the competencies of naval engineering



STUDY LOAD

Type	Hours	Percentage
Hours large group	45,0	36.00
Self study	80,0	64.00

Total learning time: 125 h

CONTENTS

PART I.1. Systems of government and manoeuvre of platforms and ships

Description:

- Propulsion and government equipment, and combined dynamics.
- Servo units.
- Offshore platforms transport.

Full-or-part-time: 14h

Theory classes: 5h

Guided activities: 2h

Self study : 7h

PART I.2. Dynamic positioning and stability systems

Description:

- Marine operations.
- Dynamic positioning system.
- Vessels with DP and operations with DP.
- Offshore platforms positioning systems.
- Calculation of platforms stability.

Full-or-part-time: 14h

Theory classes: 5h

Guided activities: 3h

Self study : 6h

PART I.3. Anchorage and mooring systems for platforms and ships

Description:

- Mooring and anchoring vessel systems.
- Mooring and anchoring platform systems.

Full-or-part-time: 8h

Theory classes: 3h

Guided activities: 2h

Self study : 3h



PART I.4. Cargo management systems (liquid cargo and dry cargo)

Description:

- Loading and unloading equipment in different vessels: liquid loads, bulk loads, general cargo, ro-ro transports.

Full-or-part-time: 8h

Theory classes: 3h

Guided activities: 2h

Self study : 3h

PART I.5. Dredging and drilling systems

Description:

- Dredging targets.
- Types of dredges and processes.
- Drilling process in Oil & Gas.
- Drilling units.

Full-or-part-time: 11h

Theory classes: 4h

Guided activities: 3h

Self study : 4h

PART I.6. Specific equipment for ships

Description:

- Systems onboard passenger ships.
- Systems onboard combat ships.

Full-or-part-time: 8h

Theory classes: 3h

Guided activities: 2h

Self study : 3h

PART II.1. Complementary techniques I

Description:

- Psychometry. Exercises
- Air conditioning and thermal conditioning of spaces (HVAC).
- Thermal balance.

Full-or-part-time: 17h

Theory classes: 6h

Guided activities: 4h

Self study : 7h



PART II.2. Complementary techniques II

Description:

- Thermography applied to nautical technology.
- Measurement techniques. Examples.

Full-or-part-time: 6h

Theory classes: 2h

Guided activities: 1h

Self study : 3h

PART II.3. Auxiliary systems

Description:

- Types and management of fuels used on ships.
- Liquefied Natural Gas (LNG) in maritime mobility.
- Concrete examples.

Full-or-part-time: 17h

Theory classes: 6h

Guided activities: 4h

Self study : 7h

PART II.4. Essential and emergency systems

Description:

- Basic and emergency lighting.
- Contribution of LED lighting in maritime mobility.
- Examples of lighting design.

Full-or-part-time: 17h

Theory classes: 6h

Guided activities: 4h

Self study : 7h

PART II.5. Other specific systems

Description:

- Underwater works. Examples.
- Hyperbaric chamber.

Full-or-part-time: 5h

Theory classes: 2h

Guided activities: 1h

Self study : 2h



GRADING SYSTEM

The final grade is the sum of the following partial grades:

$$N_{\text{final}} = 0.40 \ N_{\text{pf}} + 0.40 \ N_{\text{pt}} + 0.20 \ N_{\text{ec}}$$

N_{final} : Final qualification

N_{pf} : Final test qualification

N_{pt} : Job qualification (one)

N_{ec} : Qualification of the exercises of the course (continuous evaluation)

EXAMINATION RULES.

It is mandatory to attend the evaluation activities and participate in the classes, activities and visits that take place during the course, will determine the continuous assessment note

BIBLIOGRAPHY

Basic:

- Marí Sagarra, Ricard. Maniobra de los buques [on line]. 3a ed. Barcelona: Edicions UPC, 1999 [Consultation: 14/07/2021]. Available on: <http://hdl.handle.net/2117/103443>. ISBN 8483013266.
- Organització Internacional Marítima. SOLAS : edición refundida de 2020 : texto refundido del Convenio internacional para la seguridad de la vida humana en el mar, 1974, y su protocolo de 1988 : artículos, anexos y certificados. Londres: IMO, 2020. ISBN 9789280131253.
- MARPOL : consolidated edition [A: IMO vega on the web] [on line]. Londres: Organización Marítima Internacional, 2017 [Consultation: 02/09/2022]. Available on: <https://vp.imo.org/index.html>.

Complementary:

- Wilson, James F. (ed.). Dynamics of offshore structures. 2nd ed. Hoboken, N.J.: John Wiley & Sons, 2003. ISBN 9780471264675.
- Gerwick, Ben C. Construction of marine and offshore structures. 3rd ed. Boca Raton: CRC Press, 2007. ISBN 9780849330520.
- Sanz Bermejo, César. Manual de equipos de dragado. Madrid: l'autor, 2001. ISBN 8493129240.
- Bray, D. J. The DP operator's handbook. London: The Nautical Institute, [2015]. ISBN 9781906915254.
- Carta González, José Antonio [et al.]. Centrales de energías renovables: generación eléctrica con energías renovables [on line]. 2a ed. Madrid: PEARSON EDUCACIÓN, 2013 [Consultation: 30/05/2022]. Available on: https://www-ingebook-com.recursos.biblioteca.upc.edu/ib/NPcd/IB_BooksVis?cod_primaria=1000187&codigo_libro=1324. ISBN 978-84-832-2227-0.
- The Oil Companies International Marine Forum. Mooring equipment guidelines. 3rd ed. London: Witherbys, 2008. ISBN 9781905331321.
- Bonilla de la Corte, Antonio. Construcción naval y servicios. Vigo: L'autor, 1984. ISBN 843982629X.