

Course guide

280642 - 280642 - Mechanics Technology

Last modified: 15/01/2025

Unit in charge: Barcelona School of Nautical Studies
Teaching unit: 742 - CEN - Department of Nautical Sciences and Engineering.

Degree: BACHELOR'S DEGREE IN MARINE TECHNOLOGIES (Syllabus 2010). (Compulsory subject).

Academic year: 2024 **ECTS Credits:** 6.0 **Languages:** Catalan, Spanish

LECTURER

Coordinating lecturer: JORDI TORRALBO / RAMON GRAU MUR

Others: Primer quadrimestre:
RAMON GRAU MUR - GTM
JORGE TORRALBO GAVILAN - GTM

DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

Specific:

GTM.CE20. Process and technology related to mechanical assemblies and metrotecnia in their applications to ships.

Transversal:

TEQ N3. 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.

STCW:

ME.1. A-III/1-3. Function: Maintenance and repair at the operational level
ME.2. A-III/1-3.1 Appropriate use of hand tools, machine tools and measuring instruments for fabrication and repair on board
ME.3. A-III/1-KUP 3.1.1 Characteristics and limitations of materials used in construction and repair of ships and equipment
ME.4. A-III/1-KUP 3.1.2 Characteristics and limitations of processes used for fabrication and repair
ME.5. A-III/1-KUP 3.1.3 Properties and parameters considered in the fabrication and repair of systems and components
ME.6. A-III/1-KUP 3.1.4 Methods for carrying out Safe emergency/temporary repairs
ME.7. A-III/1-KUP 3.1.5 Safety measures to be taken to ensure a safe working environment and for using hand tools, machine tools and measuring instruments
ME.8. A-III/1-KUP 3.1.6 Use of hand tools, machine tools and measuring instruments
ME.9. A-III/1-KUP 3.1.7 Use of various types of sealants and packings
ME.10. A-III/1-3.2 Maintenance and repair of shipboard machinery and equipment
ME.11. A-III/1-KUP 3.2.1 Safety measures to be taken for repair and maintenance, including the safe isolation of shipboard machinery and equipment required before personnel are permitted to work on such machinery or equipment
ME.12. A-III/1-KUP 3.2.2 Appropriate basic mechanical knowledge and skills
ME.13. A-III/1-KUP 3.2.3 Maintenance and repair, such as dismantling, adjustment and reassembling of machinery and equipment
ME.14. A-III/1-KUP 3.2.4 The use of appropriate specialized tools and measuring instruments
ME.15. A-III/1-KUP 3.2.5 Design characteristics and selection of materials in construction of equipment
ME.16. A-III/1-KUP 3.2.6 Interpretation of machinery drawings and handbooks
ETO.1. A-III/6- 2. Function: Maintenance and repair at the operational level
ETO.2. A-III/6-2.2 Maintenance and repair of automation and control systems of main propulsion and auxiliary machinery
ETO.3. A-III/6-CCS 2.2.1 Appropriate electrical and mechanical knowledge and skills
ETO.4. A-III/6-2.4 Maintenance and repair of electrical, electronic and control
ETO.5. systems of deck machinery and cargohandling equipment

TEACHING METHODOLOGY

Theory sessions
Practical sessions

LEARNING OBJECTIVES OF THE SUBJECT

Know the processes of obtaining metals, metallurgy and steel.

Know the processes of manufacturing and mechanical technology and its application on board.

Know the main techniques of joining metals by welding and its application.

Know and apply the principles of metrotechnics.

Be able to work as a member of a team, whether as a member or performing management functions with the aim of contributing to develop projects with pragmatism and sense of responsibility, assuming commitments considering the available resources.

STUDY LOAD

Type	Hours	Percentage
Hours large group	42,0	28.00
Self study	90,0	60.00
Hours small group	18,0	12.00

Total learning time: 150 h

CONTENTS

1. Metals in the mechanical industry

Description:

This topic presents an introduction to the history of the use of materials throughout history, ferrous and non-ferrous alloys, ceramic materials, plastic materials, protective materials and lubricants, all from the point of view of the mechanical technology.

Related competencies :

A36-2.2.1. A-III/6-CCS 2.2.1 Appropriate electrical and mechanical knowledge and skills

A36-2.4.1. systems of deck machinery and cargohandling equipment

A31-3.1.1. A-III/1-KUP 3.1.1 Characteristics and limitations of materials used in construction and repair of ships and equipment

A31-3.1.3. A-III/1-KUP 3.1.3 Properties and parameters considered in the fabrication and repair of systems and components

Full-or-part-time: 14h

Theory classes: 2h

Laboratory classes: 1h

Guided activities: 1h

Self study : 10h

2. Basic tools

Description:

The most used manual tools in mechanical technology works are treated.

Related activities:

Throughout the practices the tools that are being used, their use and their care are shown.

Related competencies :

A36-2.2.1. A-III/6-CCS 2.2.1 Appropriate electrical and mechanical knowledge and skills

A36-2.4.1. systems of deck machinery and cargohandling equipment

A31-3.1.6. A-III/1-KUP 3.1.6 Use of hand tools, machine tools and measuring instruments

A31-3.1.5. A-III/1-KUP 3.1.5 Safety measures to be taken to ensure a safe working environment and for using hand tools, machine tools and measuring instruments

A31-3.1.4. A-III/1-KUP 3.1.4 Methods for carrying out Safe emergency/temporary repairs

Full-or-part-time: 14h

Theory classes: 2h

Laboratory classes: 1h

Guided activities: 1h

Self study : 10h

3. Metrology

Description:

Study of the concepts of metrology, measurement errors and units, the elements of measurement, the adjustments and tolerances.

Related activities:

There is a practice dedicated solely to the use of the micrometer and the calipers, in addition to other practices are used squares, rules, marbles, calibrated blocks and combs of thread to go using various means of measurement.

Related competencies :

A36-2.2.1. A-III/6-CCS 2.2.1 Appropriate electrical and mechanical knowledge and skills

A36-2.4.1. systems of deck machinery and cargohandling equipment

A31-3.2.6. A-III/1-KUP 3.2.6 Interpretation of machinery drawings and handbooks

Full-or-part-time: 16h

Theory classes: 2h

Laboratory classes: 3h

Guided activities: 1h

Self study : 10h

4. Casting and molding

Description:

The metals and alloys conformable by casting are studied, the stages of the foundry, the types of molding, the procedures of fusion, filling of molds, demolding and finishing and the processes involved in the project of pieces obtained by casting.

Related competencies :

A36-2.2.1. A-III/6-CCS 2.2.1 Appropriate electrical and mechanical knowledge and skills

A36-2.4.1. systems of deck machinery and cargohandling equipment

A31-3.1.2. A-III/1-KUP 3.1.2 Characteristics and limitations of processes used for fabrication and repair

A31-3.1.3. A-III/1-KUP 3.1.3 Properties and parameters considered in the fabrication and repair of systems and components

Full-or-part-time: 14h

Theory classes: 2h

Laboratory classes: 1h

Guided activities: 1h

Self study : 10h

5. Plastic deformation processes

Description:

Cold and hot work, inlay, pressing, forging, extrusion, drawing and rolling.

Related competencies :

A36-2.2.1. A-III/6-CCS 2.2.1 Appropriate electrical and mechanical knowledge and skills

A36-2.4.1. systems of deck machinery and cargohandling equipment

A31-3.1.2. A-III/1-KUP 3.1.2 Characteristics and limitations of processes used for fabrication and repair

A31-3.1.3. A-III/1-KUP 3.1.3 Properties and parameters considered in the fabrication and repair of systems and components

A31-3.1.5. A-III/1-KUP 3.1.5 Safety measures to be taken to ensure a safe working environment and for using hand tools, machine tools and measuring instruments

Full-or-part-time: 14h

Theory classes: 2h

Laboratory classes: 1h

Guided activities: 1h

Self study : 10h

6. Machining processes

Description:

Machine tools, drilling, sawing, filing, turning, milling and grinding.

Related activities:

In the practices, the topics of drilling, sawing, turning and milling are worked on.

Related competencies :

A36-2.2.1. A-III/6-CCS 2.2.1 Appropriate electrical and mechanical knowledge and skills

A31-3.2.5. A-III/1-KUP 3.2.5 Design characteristics and selection of materials in construction of equipment

A36-2.4.1. systems of deck machinery and cargohandling equipment

A31-3.2.3. A-III/1-KUP 3.2.3 Maintenance and repair, such as dismantling, adjustment and reassembling of machinery and equipment

A31-3.2.2. A-III/1-KUP 3.2.2 Appropriate basic mechanical knowledge and skills

Full-or-part-time: 27h

Theory classes: 4h

Laboratory classes: 12h

Guided activities: 1h

Self study : 10h

7. Heat treatments

Description:

Thermomechanical, thermal, thermophysical and superficial treatments.

Related competencies :

A36-2.2.1. A-III/6-CCS 2.2.1 Appropriate electrical and mechanical knowledge and skills

A36-2.4.1. systems of deck machinery and cargohandling equipment

A31-3.1.3. A-III/1-KUP 3.1.3 Properties and parameters considered in the fabrication and repair of systems and components

Full-or-part-time: 14h

Theory classes: 2h

Laboratory classes: 1h

Guided activities: 1h

Self study : 10h

8. Union systems

Description:

Temporary and permanent bonding systems

Specific objectives:

W KUPs 8.4 8.7

Related activities:

In the practices, different welding types and techniques are carried out

Related competencies :

A36-2.2.1. A-III/6-CCS 2.2.1 Appropriate electrical and mechanical knowledge and skills

A36-2.4.1. systems of deck machinery and cargohandling equipment

A31-3.1.7. A-III/1-KUP 3.1.7 Use of various types of sealants and packings

A31-3.1.4. A-III/1-KUP 3.1.4 Methods for carrying out Safe emergency/temporary repairs

Full-or-part-time: 37h

Theory classes: 4h

Laboratory classes: 14h

Guided activities: 9h

Self study : 10h

GRADING SYSTEM

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

$$N_{\text{final}} = 0.2 N_{\text{pc}} + 0.3 N_{\text{sc}} + 0.5 N_{\text{pt}}$$

N_{final}: Final note of the subject

N_{pc}: Note of the first control

N_{sc}: Note of the second control

N_{pt}: Note of Workshop practices

A final re-evaluation test will be carried out for students who meet the requirements established by the center's regulations, which will consist of a single test in which the entire course subject will be evaluated.



EXAMINATION RULES.

Attendance at the internship is mandatory. The subject can not be approved if the practices are not approved.

The attendance to the theoretical classes will be taken into account at the time of the final evaluation. It will be considered not presented when not all of the tests are completed.

BIBLIOGRAPHY

Basic:

- Coca Rebollero, Pedro; Rosique Jiménez, Juan. Tecnología mecánica y metrotecnica. Madrid: Pirámide, 1996. ISBN 8436816633.
- ASM Handbook. Vol. 6, Welding, Brazing and Soldering. 9th ed. Ohio: American Society for Metals, 1993. ISBN 0871700123.
- Bertolín Gil, Sergio. Procesos de mecanizado. Barcelona: Marcombo, 2013. ISBN 9788426720542.
- Gerling, Heinrich. Alrededor de las máquinas herramientas. 3a ed. Barcelona: Reverté, 1984. ISBN 8429160493.
- Lobjois, Ch. Uniones y soldaduras : provisionales y permanentes. Barcelona: CEAC, 2004. ISBN 8432934186.
- Krar, Steve F.; Gill, Arthur R.; Smid, Peter. Tecnología de las máquinas herramienta. 6a ed. Barcelona: Marcombo, 2009. ISBN 9788426714411.

Complementary:

- Electro-technical officer. IMO model course 7.08. London: International Maritime Organization, 2014. ISBN 9789280115802.