

## Course guide

# 280695 - 280695 - Inspection, Maintenance and Repair of Electric Facilities

Last modified: 27/05/2024

<b>Unit in charge:</b>	Barcelona School of Nautical Studies	
<b>Teaching unit:</b>	709 - DEE - Department of Electrical Engineering.	
<b>Degree:</b>	BACHELOR'S DEGREE IN MARINE TECHNOLOGIES (Syllabus 2010). (Optional subject). BACHELOR'S DEGREE IN NAVAL SYSTEMS AND TECHNOLOGY ENGINEERING (Syllabus 2010). (Optional subject).	
<b>Academic year:</b> 2024	<b>ECTS Credits:</b> 6.0	<b>Languages:</b> Catalan, Spanish

## LECTURER

<b>Coordinating lecturer:</b>	VICTOR FUSES NAVARRA
<b>Others:</b>	Primer quadrimestre: VICTOR FUSES NAVARRA - DT, GESTN, GTM

## REQUIREMENTS

To register this subject, it must be approved: 280665 Electrical Plant of the Ship, or, 280660 Electric propulsion and power electronics.

## DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

### Specific:

CE17.GESTN. Knowledge of systems for quality assessment, and regulatory and safety-related resources and environmental protection.

CE28.GESTN. Ability to perform an exercise to do individually and original present and defend in court the university, consisting of a project in the field of naval engineering technical ca in their field of propulsion and ship's services, of a professional nature which synthesize and integrate the skills acquired in teaching.

CE5. Adequate knowledge of the concept of business, institutional and legal framework of the company. Organization and management of corporate finance firms and turtles.

CE12. Knowledge, use and application of the principles of the ship systems and quality management applied to the vessel and safety management audits of the ship.

CE17. Knowledge, use and application to ship the principles of the laws and regulations marina.

CE33.GEM. Knowledge of inspection procedures and the functioning of the Classification Societies.

### Transversal:

04 COE N3. EFFICIENT ORAL AND WRITTEN COMMUNICATION - Level 3. Communicating clearly and efficiently in oral and written presentations. Adapting to audiences and communication aims by using suitable strategies and means.

05 TEQ N1. TEAMWORK - Level 1. Working in a team and making positive contributions once the aims and group and individual responsibilities have been defined. Reaching joint decisions on the strategy to be followed.

### STCW:

A36-1.1.3. A-III/6-KUP 1.1.3 Knowledge of Electrotechnology and electrical machines theory  
 A36-1.1.4. A-III/6-KUP 1.1.4 Knowledge of Fundamentals of electronics and power electronics  
 A36-1.1.5. A-III/6-KUP 1.1.5 Knowledge of: Electrical power distribution boards and electrical equipment  
 A36-1.1.6. A-III/6-KUP 1.1.6 Knowledge of: Fundamentals of automation, automatic control systems and technology  
 A36-1.1.9. A-III/6-KUP 1.1.9 Knowledge of: Technology of electrical materials  
 A36-2.1.1. A-III/6-KUP 2.1.1 Safety requirements for working on shipboard electrical systems, including the safe isolation of electrical equipment required before personnel are permitted to work on such equipment  
 A36-2.1.4. A-III/6-CCS 2.1.4 Construction and operation of electrical testing and measuring equipment  
 A36-2.1.5a. A-III/6-CCS 2.1.5.1 Function and performance tests of the following equipment and their configuration: .1 monitoring systems  
 A36-2.1.5b. A-III/6-CCS 2.1.5.2 Function and performance tests of the following equipment and their configuration: .2 automatic control devices  
 A36-2.1.5c. A-III/6-CCS 2.1.5.3 Function and performance tests of the following equipment and their configuration: .3 protective devices  
 A36-2.1.5d. A-III/6-CCS 2.1.5.4 Function and performance tests of the following equipment and their configuration: .4 The interpretation of electrical and electronic diagrams  
 A36-2.2.4. A-III/6-CCS 2.2.4 Safety and emergency procedures: Test, detect faults and maintain and restore electrical and electronic control equipment to operating condition  
 A36-2.3.2. A-III/6-CCS 2.3.2 Theoretical knowledge: Electrical and electronic systems operating in flammable areas  
 A36-2.4.4. A-III/6-CCS 2.4.3 Safety and emergency procedures: Practical knowledge for the testing, maintenance, fault finding and repair  
 A36-2.5.1. A-III/6-2.5 Maintenance and repair of control and safety systems of hotel equipment  
 A36-2-5.3. A-III/6-CCS 2.5.2 Practical knowledge: Carrying out safe maintenance and repair procedures

### TEACHING METHODOLOGY

- Analysis of real applications.
- Receive, understand and synthesize knowledge.
- Define and solve problems.
- Develop the reasoning and critical spirit, and defend it in an oral or written way.

### LEARNING OBJECTIVES OF THE SUBJECT

- Understand and apply the standards or technical regulations.
- Use the electrical diagrams as an inspection and maintenance tool.
- Know the different types of maintenance that can be applied.
- Apply procedures for early detection of breakdowns
- Knowledge about safety procedures
- Understand the properties of the materials of the electrical installations.

### STUDY LOAD

Type	Hours	Percentage
Hours large group	60,0	40.00
Self study	90,0	60.00

**Total learning time:** 150 h



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### Electric Technical Regulations

**Description:**

Issuing entities of standards. Categories of standards and areas of application. Process of writing a standard. Fundamental terminology for the interpretation of the rules.

**Specific objectives:**

Use of technical language Identification of deficiencies in a facility.

**Related activities:**

Drafting of technical report of deficiencies of a facility based on a selection of standards.

**Full-or-part-time:** 8h

Theory classes: 6h

Practical classes: 2h

### Electrical diagrams as an inspection, maintenance and repair tool

**Description:**

Standardized symbology. Types of schemes. Modification, revision and approval of the electrical diagrams. Examples.

**Specific objectives:**

Interpretation and use of electrical diagrams.

**Related activities:**

Elaboration of the scheme of an installation.

**Full-or-part-time:** 8h

Theory classes: 6h

Guided activities: 2h

### Maintenance

**Description:**

Types of maintenance. The maintenance plan for an installation. Working procedures. Planning of material and human resources. Drafting of maintenance reports. Maintenance management tools. Work orders. Evaluation of maintenance quality.

**Related activities:**

Writing a maintenance plan.

**Full-or-part-time:** 8h

Theory classes: 4h

Practical classes: 2h

Guided activities: 2h



### Premature fault detection

**Description:**

Methods of detection of breakdowns. Types of sensors. Systems for evaluation of the reliability of the signals of the sensors. SCADA systems. Datalogging. Alarms. Programming of PLC. Harmonics.

**Specific objectives:**

Programming of a PLC.

**Related activities:**

Programming of a PLC for automatic recording of periodic voltage and current readings of lead batteries.

**Full-or-part-time:** 6h

Theory classes: 2h

Practical classes: 4h

### Behavior of materials

**Description:**

Study of the behavior of the usual materials of the electrical installations from 5 points of view: electrical, dielectric, magnetic, mechanical and thermal. Types of conductors. High voltage and high current tests.

**Specific objectives:**

Acquire skills in the essay of materials. Correct handling of the oscilloscope.

**Related activities:**

Participate in the testing of conductors and insulators. Writing a report of the essays.

**Full-or-part-time:** 6h

Theory classes: 4h

Practical classes: 2h

### Operation in degraded modes

**Description:**

Relationship between the maintenance plan and the emergency plan. Technical limits of engines, generators, installations, protections and materials. Reversible overload and destructive overload.

**Related activities:**

Protections test. Report writing.

**Full-or-part-time:** 5h

Practical classes: 5h

### Repairs.

**Description:**

Practical troubleshooting sessions, repair study, and repair.

**Specific objectives:**

Autonomy, critical sense. Use of equemes.

**Related activities:**

Repair of different devices, equipment ... according to availability.

**Full-or-part-time:** 10h

Laboratory classes: 10h



### Safety procedures

**Description:**

Effects of electricity on the human body and on the facilities. The 5 golden rules. Enclaves. Types of land regimes. Direct and indirect contacts. The differential switch. Double insulation. Galvanic insulation. Insulation meters. Megaohmmeter

**Related activities:**

Study of leakage currents in an installation.

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

Theory classes: 8h

Guided activities: 1h

## ACTIVITIES

### Complete maintenance plan

**Description:**

Preparation of a complete maintenance plan for a machine or installation of free choice, with temporary, economic, material planning and evaluation criteria for the degree of execution of maintenance. It must include a risk assessment.

**Specific objectives:**

Oral and written expression.

**Delivery:**

Before final exam, the work must be defended orally in class.

**Full-or-part-time:** 20h

Self study: 20h

## GRADING SYSTEM

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

$$N_{\text{final}} = 0.3 * N_{\text{pf}} + 0.4 * N_{\text{ac}} + 0.3 * N_{\text{eL}}$$

$N_{\text{final}}$ : final grade.

$N_{\text{pf}}$ : final evaluation grade.

$N_{\text{ac}}$ : grade for continuous evaluation and directed activities.

$N_{\text{eL}}$ : grade of practical activities / laboratory evaluation.

The continuous evaluation consists of different cumulative activities, both individual and group, of a formative nature, carried out during the course (in the classroom and outside it), exams, work, etc.

## EXAMINATION RULES.

- It will be an indispensable requirement to pass the subject, to approve the practical activities / laboratory ( $N_{\text{eL}} > 5$ ).
- If one of the practical activities or continuous assessment is not carried out, it will be considered as not punctuated.
- It will be considered Not submitted: Who has not attended or has a global grade less than 0.5 points.
- In no case, any type of form can be available in the learning controls or tests.
- Only calculators and pens are allowed in exams.
- The use of cell phones in class is not allowed.



## BIBLIOGRAPHY

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### Basic:

- Organització Internacional Marítima. Electro-technical officer. Imo Model Course 7.08. London: International Maritime Organization, 2014. ISBN 9789280115802.

## RESOURCES

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### Other resources:

- Notes and articles contributed by the teacher
- Regulations of Classification Societies
- Dossiers of manufacturers: Electra Molins, ABB, Siemens, Schneider Electric.