Course guide
280695 - 280695 - Inspection, Maintenance and Repair of Electric Facilities

Unit in charge: Barcelona School of Nautical Studies
Teaching unit: 709 - DEE - Department of Electrical Engineering.
Degree: BACHELOR'S DEGREE IN MARINE TECHNOLOGIES (Syllabus 2010). (Optional subject).
BACHELOR'S DEGREE IN NAVAL SYSTEMS AND TECHNOLOGY ENGINEERING (Syllabus 2010). (Optional subject).
Academic year: 2022
ECTS Credits: 6.0
Languages: Catalan, Spanish

LECTURER
Coordinating lecturer: VICTOR FUSES NAVARRA
Others: 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.
CE17. 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

<table>
<thead>
<tr>
<th>Type</th>
<th>Hours</th>
<th>Percentage</th>
</tr>
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<tbody>
<tr>
<td>Self study</td>
<td>90,0</td>
<td>60.00</td>
</tr>
<tr>
<td>Hours large group</td>
<td>30,0</td>
<td>20.00</td>
</tr>
<tr>
<td>Guided activities</td>
<td>5,0</td>
<td>3.33</td>
</tr>
<tr>
<td>Hours small group</td>
<td>10,0</td>
<td>6.67</td>
</tr>
<tr>
<td>Hours medium group</td>
<td>15,0</td>
<td>10.00</td>
</tr>
</tbody>
</table>

Total learning time: 150 h
## Electric Technical Regulations

**Description:**

**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:**

**Related activities:**
Writing a maintenance plan.

**Full-or-part-time:** 8h
Theory classes: 4h
Practical classes: 2h
Guided activities: 2h
Premature fault detection

Description:

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:

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:

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:

\[ N_{\text{final}} = 0.3 \times N_{\text{pf}} + 0.4 \times N_{\text{ac}} + 0.3 \times N_{\text{eL}} \]

\( N_{\text{final}} \): 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

Basic:

RESOURCES

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