280695 - Inspection, Maintenance and Repair of Electric Facilities

Coordinating unit: 280 - FNB - Barcelona School of Nautical Studies
Teaching unit: 709 - DEE - Department of Electrical Engineering
Academic year: 2020
Degree: BACHELOR'S DEGREE IN NAVAL SYSTEMS AND TECHNOLOGY ENGINEERING (Syllabus 2010). (Teaching unit Optional)
BACHELOR'S DEGREE IN MARINE TECHNOLOGIES (Syllabus 2010). (Teaching unit Optional)
BACHELOR'S DEGREE IN MARINE TECHNOLOGIES/BACHELOR'S DEGREE IN NAVAL SYSTEMS AND TECHNOLOGY ENGINEERING (Syllabus 2016). (Teaching unit Optional)
ECTS credits: 6
Teaching languages: Catalan, Spanish

Opening hours

Timetable: The timetable for personal attention will be published at the beginning of the semester.

Requirements

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

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>Total learning time: 150h</th>
<th>Hours large group: 30h</th>
<th>20.00%</th>
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</thead>
<tbody>
<tr>
<td>Hours medium group: 15h</td>
<td>10.00%</td>
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<tr>
<td>Hours small group: 10h</td>
<td>6.67%</td>
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<tr>
<td>Guided activities: 5h</td>
<td>3.33%</td>
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<tr>
<td>Self study: 90h</td>
<td>60.00%</td>
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</table>
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## Content

### Electric Technical Regulations

<table>
<thead>
<tr>
<th>Learning time: 8h</th>
</tr>
</thead>
<tbody>
<tr>
<td>Theory classes: 6h</td>
</tr>
<tr>
<td>Practical classes: 2h</td>
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</table>

**Description:**

**Related activities:**
Drafting of technical report of deficiencies of a facility based on a selection of standards.

**Specific objectives:**
Use of technical language Identification of deficiencies in a facility.

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

<table>
<thead>
<tr>
<th>Learning time: 8h</th>
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</thead>
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<tr>
<td>Theory classes: 6h</td>
</tr>
<tr>
<td>Guided activities: 2h</td>
</tr>
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</table>

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

**Related activities:**
Elaboration of the scheme of an installation.

**Specific objectives:**
Interpretation and use of electrical diagrams.

### Maintenance

<table>
<thead>
<tr>
<th>Learning time: 8h</th>
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<tbody>
<tr>
<td>Theory classes: 4h</td>
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<tr>
<td>Practical classes: 2h</td>
</tr>
<tr>
<td>Guided activities: 2h</td>
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</table>

**Description:**

**Related activities:**
Writing a maintenance plan.
## Premature fault detection

**Learning time:** 6h
- Theory classes: 2h
- Practical classes: 4h

**Description:**

**Related activities:**
Programming of a PLC for automatic recording of periodic voltage and current readings of lead batteries.

**Specific objectives:**
Programming of a PLC.

## Behavior of materials

**Learning time:** 6h
- Theory classes: 4h
- Practical classes: 2h

**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.

**Related activities:**
Participate in the testing of conductors and insulators. Writing a report of the essays.

**Specific objectives:**
Acquire skills in the essay of materials. Correct handling of the oscilloscope.

## Operation in degraded modes

**Learning time:** 5h
- Practical classes: 5h

**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:**
## Repairs.

<table>
<thead>
<tr>
<th>Learning time</th>
<th>Laboratory classes: 10h</th>
</tr>
</thead>
</table>

**Description:**
Practical troubleshooting sessions, repair study, and repair.

**Related activities:**
Repair of different devices, equipment ... according to availability.

**Specific objectives:**
Autonomy, critical sense. Use of equemes.

## Safety procedures

<table>
<thead>
<tr>
<th>Learning time</th>
<th>Theory classes: 8h</th>
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<tbody>
<tr>
<td></td>
<td>Guided activities: 1h</td>
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</table>

**Description:**

**Related activities:**
Study of leakage currents in an installation.

## Planning of activities

### Complete maintenance plan

<table>
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<tr>
<th>Hours</th>
<th>Self study: 20h</th>
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**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.

**Descriptions of the assignments due and their relation to the assessment:**
Before final exam, the work must be defended orally in class.

**Specific objectives:**
Oral and written expression.
Qualification 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.

Regulations for carrying out activities

- 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

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