280695 - Inspection, Maintenance and Repair of Electric Facilities

Coordinating unit: 280 - FNB - Barcelona School of Nautical Studies
Teaching unit: 709 - EE - Department of Electrical Engineering
Academic year: 2019
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

Teaching staff
Coordinator: VICTOR FUSES NAVARRA

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

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

<table>
<thead>
<tr>
<th>Electrical diagrams as an inspection, maintenance and repair tool</th>
<th>Learning time: 8h</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Theory classes: 6h</td>
</tr>
<tr>
<td></td>
<td>Guided activities: 2h</td>
</tr>
</tbody>
</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.

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

**Description:**

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

**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.

**Learning 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.

**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.

**Learning 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:**

**Learning time:** 5h
- Practical classes: 5h
### Repairs.

**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.

**Learning time:**
- Laboratory classes: 10h

### Safety procedures

**Description:**

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

**Learning time:**
- Theory classes: 8h
- Guided activities: 1h

### Planning of activities

#### Complete maintenance plan

**Hours:**
- 20h
- Self study: 20h

**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:
\[ N_{\text{final}} = 0.3 \times N_{pf} + 0.4 \times N_{ac} + 0.3 \times N_{E}\]

- \( N_{\text{final}} \): final grade.
- \( N_{pf} \): final evaluation grade.
- \( N_{ac} \): grade for continuous evaluation and directed activities.
- \( N_{E} \): 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 (\( N_{E} > 5 \)).
- 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.