280685 - Maintenance and Repair of Equipment and Electric Systems on Board

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 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: Fuses Navarra, Victor

Requirements
To register this subject, it must be approved:
280641 Electricity and electrical engineering
280660 Electric propulsion and power electronics, or, 280665 Vessel Power Plant.

Degree competences to which the subject contributes

Specific:
1. Knowledge of the organization and project management of repair, installation, modification, redesign and maintenance of machines and systems of ships, within the scope of its special ad, ie, operation and exploitation.

General:
3. IDENTIFY I resoldre Capacitat PER L'Ambit problemes IN MARINA DE L'ENGINEERING. Capacitat per the plantejament i resolució of problemes de l'àimbit enginyeria assumint marina iniciatives, prenent decisions i aplicant solucions creatives in the marc d'a systematic methodology.

Transversal:
2. SELF-DIRECTED LEARNING - Level 2: Completing set tasks based on the guidelines set by lecturers. Devoting the time needed to complete each task, including personal contributions and expanding on the recommended information sources.

Teaching methodology
- Receive, understand and synthesize knowledge.
- Analysis of real applications.
- Define and solve problems.
- Application of theoretical knowledge to the maintenance of electrical systems.
- Perform work individually.

Learning objectives of the subject
- Understand and apply the norms or technical regulations.
- Use the electrical diagrams as an inspection and maintenance tool.
- Know the different types of maintenance applicable.
- Apply procedures for early detection of breakdowns.
- Know the security procedures.
- Understand the properties of the materials and the electrical installations in case of fire.

This course will evaluate the following STCW competences and KUPs (Section A-III/6):
280685 - Maintenance and Repair of Equipment and Electric Systems on Board

E.3. Operate generators and distribution systems. (KUPs: E.3.1 and E.3.2)
E.8. Maintenance and repair of electrical and electronic equipment. (KUPs: from E.8.1 to E.8.5)
E.9. Maintenance and repair of automation and control systems of main propulsion and auxiliary machinery. (KUPs: from E.9.1 to E.9.4)
E.11. Maintenance and repair of electrical, electronic and control systems of deck machinery and cargo-handling equipment. (KUPs: from E.11.1 to E.11.8)
E.12. Maintenance and repair of control and safety systems of hotel equipment. (KUPs: from E.12.1 to E.12.3)

Study load

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

- Tema 1. Electric Technical Regulations

**Learning time:** 4h
- Theory classes: 4h

**Description:**
UNE, IEC, etc. Standardization committees, classification societies. Safety requirements. Electrical working authorisations. Safe isolation equipment. Examples of test regulations: power switches, insulators, conductors, generators, etc. Electrical testing and measuring equipment.

- Topic 2. Electrical diagrams as a maintenance and repair tool

**Learning time:** 6h
- Theory classes: 4h
- Guided activities: 2h

**Description:**
STCW competences and KUPs from Section A-III/6: E.3.1, E.3.2, E.8.5

- Topic 3- Maintenance

**Learning time:** 6h
- Theory classes: 4h
- Guided activities: 2h

**Description:**

- Topic 4. Premature fault detection

**Learning time:** 8h
- Theory classes: 4h
- Laboratory classes: 4h

**Description:**
STCW competences and KUPs from Section A-III/6: E.8.3, E.11.4, E.11.5, E.11.8, E.12.3
### - Topic 5. Knowledge and behaviour of materials

**Description:**
STCW competences and KUPs from Section A-III/6: E.11.1, E.11.6, E.12.1.

**Learning time:** 4h  
- Theory classes: 4h

### - Topic 6. Operation in degraded modes

**Description:**
Study of cases:
- Recovery of a "electric lock out".
- Management of large electrical collapses.
- Load sharing, coupling and breaking.

**Learning time:** 10h  
- Laboratory classes: 8h
- Guided activities: 2h

### - Topic 7. Repairs

**Description:**

**Learning time:** 10h  
- Theory classes: 8h
- Laboratory classes: 2h

### - Topic 8. Safety procedures

**Description:**
Security in the electrical maintenance of: the people, the installation, third parties.

**Learning time:** 6h  
- Theory classes: 2h
- Laboratory classes: 2h
- Guided activities: 2h
280685 - Maintenance and Repair of Equipment and Electric Systems on Board

- **Tema 9. Fires of electrical origin**

  **Learning time:** 6h  
  **Theory classes:** 6h

<table>
<thead>
<tr>
<th>Description:</th>
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<tr>
<td>Causes, propagation, accelerators, extinction, repair, expertise. Electrical insulation and fire on board. STCW competences from Section A-III/6 and KUPs E.11.6, E.12.1.</td>
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**Qualification system**

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

\[ \text{N}_{\text{final}} = 0.2 \times \text{N}_{\text{pf}} + 0.8 \times \text{N}_{\text{ac}} \]

\( \text{N}_{\text{final}} \): final grade.  
\( \text{N}_{\text{pf}} \): final evaluation grade.  
\( \text{N}_{\text{ac}} \): grade for continuous evaluation and directed activities.

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 of it), exams, work, practical and laboratory activities, etc.

**Regulations for carrying out activities**

- Assistance and completion of laboratory practices is mandatory.
- If any of the laboratory activities or continuous evaluation is not carried out, it will be considered as not punctuated.
- Will be considered Not Submitted: Who has not attended or has a global grade lower than 0.5 points.
- In no case you can have forms in the learning controls or exams.
- In exams only calculator and pens are allowed.
- The use of mobile phones is not allowed.

**Bibliography**

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