280686 - Maintenance and Repair of Equipment and Electronic Systems

Coordinating unit: 280 - FNB - Barcelona School of Nautical Studies
Teaching unit: 710 - EEL - Department of Electronic 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

Teaching staff
Coordinator: Josep M. Torrents

Opening hours
TimeTable: To be arranged via email. Monday from 12 am to 1 pm.

Prior skills
Electric current, electrical voltage, power and energy, their relation within electrical circuits and the use of their units in the SI. Basic circuit analysis (Kirchoff and Ohm laws). Numbering bases (binary, octal and hexadecimal). Knowledge of electronic instrumentation.

Requirements
280647 Naval Electronics

Teaching methodology
Various methodologies are combined: Lecture class, problem class, videos and presentations discussed in class. Laboratory and field practices.

Learning objectives of the subject
Types of maintenance of electronic equipment.
Classification Companies of Standards and Regulations.
Security procedures.
Early detection of faults, preventive maintenance.
Acting in the event of a failure.
Typology of electronic systems.
Equipment and materials to detect, locate and repair failures.

Besides, this subject achieves the following STCW competences, section A-III / 6:

E.8 Maintenance and repair of electrical and electronic equipment.
E.8.3 Detection of electric malfunction, location of faults and measures to prevent damage
E.8.4 Construction and operation of electrical testing and measuring equipment
E.8.5 Function and performance tests of the following equipment and their configuration:
   .1 monitoring systems
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.2 automatic control devices
.3 protective devices
.4 The interpretation of electrical and electronic diagrams

E.9 Maintenance and repair of automation and control systems of main propulsion and auxiliary machinery
  E.9.3 Practical knowledge for the testing, maintenance, fault finding and repair
  E.9.4 Test, detect faults and maintain and restore electrical and electronic control equipment to operating condition

E.11 Maintenance and repair of electrical, electronic and control systems of deck machinery and cargo-handling equipment
  E.11.4 Practical knowledge for the testing, maintenance, fault finding and repair
  E.11.5 Test, detect faults and maintain and restore electrical and electronic control equipment to operating condition
  E.11.6 Electrical and electronic systems operating in flammable areas
  E.11.7 Carrying out safe maintenance and repair procedures
  E.11.8 Detection of machinery malfunction, location of faults and action to prevent damage

E.12 Maintenance and repair of control and safety systems of hotel equipment
  E.12.1 Electrical and electronic systems operating in flammable areas
  E.12.2 Carrying out safe maintenance and repair procedures
  E.12.3 Detection of machinery malfunction, location of faults and action to prevent damage

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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Table: Regulations of DNV, ABS and SOLAS

<table>
<thead>
<tr>
<th>Description:</th>
<th>Learning time: 15h</th>
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</thead>
<tbody>
<tr>
<td>Description of the basic points of these regulations as an introduction to the technical topics covered in this course.</td>
<td>Theory classes: 7h 30m</td>
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<tr>
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<td>Practical classes: 2h 30m</td>
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<tr>
<td></td>
<td>Laboratory classes: 4h</td>
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<tr>
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<td>Guided activities: 1h</td>
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Specific objectives:
This course follows the STCW competences Section A-III / 6. KUPs:
E.8 Maintenance and repair of electrical and electronic equipment.
   E.8.3 Detection of electric malfunction, location of faults and measures to prevent damage
   E.8.4 Construction and operation of electrical testing and measuring equipment
   E.8.5 Function and performance tests of the following equipment and their configuration:
      .1 monitoring systems
      .2 automatic control devices
      .3 protective devices
      .4 The interpretation of electrical and electronic diagrams
E.9 Maintenance and repair of automation and control systems of main propulsion and auxiliary machinery
   E.9.3 Practical knowledge for the testing, maintenance, fault finding and repair
   E.9.4 Test, detect faults and maintain and restore electrical and electronic control equipment to operating condition
E.11 Maintenance and repair of electrical, electronic and control systems of deck machinery and cargo-handling equipment
   E.11.4 Practical knowledge for the testing, maintenance, fault finding and repair
   E.11.5 Test, detect faults and maintain and restore electrical and electronic control equipment to operating condition
   E.11.6 Electrical and electronic systems operating in flammable areas
   E.11.7 Carrying out safe maintenance and repair procedures
   E.11.8 Detection of machinery malfunction, location of faults and action to prevent damage
E.12 Maintenance and repair of control and safety systems of hotel equipment
   E.12.1 Electrical and electronic systems operating in flammable areas
   E.12.2 Carrying out safe maintenance and repair procedures
   E.12.3 Detection of machinery malfunction, location of faults and action to prevent damage.

**Description:**

"This course follows the STCW competences Section A-III / 6:" E.8 Maintenance and repair of electrical and electronic equipment, KUPs E.8.3 to E.8.5; E.9 Maintenance and repair of automation and control systems of main propulsion and auxiliary machinery, KUPs E.9.3 and E.9.4; E.11 Maintenance and repair of electrical, electronic and control systems of deck machinery and cargo-handling equipment, KUPs E.11.4 to E.11.8, and E.12 Maintenance and repair of control and safety systems of hotel equipment, KUPs E.12.1 to E.12.3.

<table>
<thead>
<tr>
<th>Learning time: 37h 30m</th>
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<tbody>
<tr>
<td>Theory classes: 7h 30m</td>
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<td>Practical classes: 1h</td>
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<tr>
<td>Laboratory classes: 2h 30m</td>
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<tr>
<td>Guided activities: 4h</td>
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<tr>
<td>Self study : 22h 30m</td>
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Electronic systems on board, specifications. Sensors on board. Electronic equipment calibration

**Description:**
On-board sensors, equipment and electronic systems are studied and specified.

"This course follows the STCW competences Section A-III / 6:" E.8 Maintenance and repair of electrical and electronic equipment, KUPs E.8.3 to E.8.5; E.9 Maintenance and repair of automation and control systems of main propulsion and auxiliary machinery, KUPs E.9.3 and E.9.4; E.11 Maintenance and repair of electrical, electronic and control systems of deck machinery and cargo-handling equipment, KUPs E.11.4 to E.11.8, and E.12 Maintenance and repair of control and safety systems of hotel equipment, KUPs E.12.1 to E.12.3.
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Electronic equipment on board: maintenance, calibration and repair. Assemblies, with PCB’s and welding

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<td>Self study: 22h 30m</td>
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**Description:**
Notions for maintaining onboard electronic equipment, how to calibrate and repair strategies when a failure occurs. PCB (printed circuit board) and tin-lead solder assemblies are made.

"This course follows the STCW competences Section A-III / 6:" E.8 Maintenance and repair of electrical and electronic equipment, KUPs E.8.3 to E.8.5; E.9 Maintenance and repair of automation and control systems of main propulsion and auxiliary machinery, KUPs E.9.3 and E.9.4; E.11 Maintenance and repair of electrical, electronic and control systems of deck machinery and cargo-handling equipment, KUPs E.11.4 to E.11.8, and E.12 Maintenance and repair of control and safety systems of hotel equipment, KUPs E.12.1 to E.12.3.

**Qualification system**
To pass, students must pass an exam and the correct resolution of exercises (theoretical and / or practical). The final grade is calculated as the average between the exam and the exercises.

**Regulations for carrying out activities**
The exam is individual; only pen (not pencil) and scientific calculator (not programmable) allowed. Mobile is not allowed.

**Bibliography**

**Basic:**