Course guides  
280665 - 280665 - Ship Power Plant

Unit in charge: Barcelona School of Nautical Studies  
Teaching unit: 709 - DEE - Department of Electrical Engineering.
Degree: BACHELOR’S DEGREE IN NAVAL SYSTEMS AND TECHNOLOGY ENGINEERING (Syllabus 2010). (Compulsory subject).
Academic year: 2021  
ECTS Credits: 4.5  
Languages: Catalan, Spanish

LECTURER

Coordinating lecturer: PABLO CASALS TORRENS
Others: Segon quadrimestre:
PABLO CASALS TORRENS - DT, GESTN
JAVIER CORCUERA GIMENO - DT, GESTN
PEDRO IGNACIO MUÑOZ HERNANDEZ - DT, GESTN
VICENÇ RODRIGUEZ BARRAGUER - DT, GESTN

REQUIREMENTS

Subjet 280641

DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

Specific:
2. Knowledge of electrical machines and marine electrical systems.

Transversal:
1. EFFICIENT ORAL AND WRITTEN COMMUNICATION - Level 1. Planning oral communication, answering questions properly and writing straightforward texts that are spelt correctly and are grammatically coherent.

TEACHING METHODOLOGY

Real applications analysis.  
Application of theoretical knowledge to the laboratory practices.  
Attitude and skills development for power plants operation.  
Case studies and articles on the subject.  
Perform work individually.

LEARNING OBJECTIVES OF THE SUBJECT

- Understanding the basics of electrical machines.  
- Understand the schemes and connections of different types of machines and applications.  
- Understand the regulatory systems of V, f, P, Q in synchronous generators in island and parallel.  
- Having the ability to do calculations and solve problems of electrical machines, using the corresponding equivalent circuits.  
- Perform calculations for electrical installations of the ship.
STUDY LOAD

<table>
<thead>
<tr>
<th>Type</th>
<th>Hours</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Hours small group</td>
<td>10,0</td>
<td>8.89</td>
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<tr>
<td>Hours large group</td>
<td>30,0</td>
<td>26.67</td>
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<tr>
<td>Self study</td>
<td>67,5</td>
<td>60.00</td>
</tr>
<tr>
<td>Guided activities</td>
<td>5,0</td>
<td>4.44</td>
</tr>
</tbody>
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Total learning time: 112.5 h

CONTENTS

**Synchronous machine**

**Description:**
Having knowledge about the operation of electrical distribution systems, generation plant, generators and their synchronization, associated control circuits. Operational and construction in the AC electrical systems and equipment onboard features. Having the basic knowledge for the maintenance of electrical machines and their control systems.

Competences in accordance with STCW Code Section A-III/1: 6. Operate electrical, electronic and control systems. KUP 6.1 Electrical equipment and 7. Maintenance and repair of electrical and electronic equipment. KUPs 7.1 to 7.4

**Full-or-part-time:** 11h
- Theory classes: 7h
- Laboratory classes: 4h

**Energy balance**

**Description:**
Having knowledge about the operation of electrical distribution systems, power plant.


**Full-or-part-time:** 3h
- Theory classes: 3h

**Asynchronous machine**

**Description:**
Having knowledge about the operation of electrical distribution systems, motors and starters, associated control circuits. Operational and construction in the AC electrical systems and equipment onboard features. Having the basic knowledge for the maintenance of electrical machines and their control systems.

Competences in accordance with STCW Code Section A-III/1: 6. Operate electrical, electronic and control systems. KUP 6.1 Electrical equipment and 7. Maintenance and repair of electrical and electronic equipment. KUPs 7.1 to 7.4

**Full-or-part-time:** 8h
- Theory classes: 2h
- Laboratory classes: 6h
## Start systems

**Description:**
Having knowledge about the operation of electrical distribution systems, motors and starters, associated control circuits. Operational and construction in the AC electrical systems and equipment onboard features. Having the basic knowledge for the maintenance of electrical machines and their control systems.

Competences in accordance with STCW Code Section A-III/1:
6. Operate electrical, electronic and control systems. KUP 6.1 Electrical equipment and
7. Maintenance and repair of electrical and electronic equipment. KUPs 7.1 to 7.4

**Full-or-part-time:** 4h
Theory classes: 2h
Laboratory classes: 2h

## Static converters

**Description:**
Having knowledge about the operation of electrical distribution systems, generation plant, generators and their synchronization, and start motors. Electronic converters (static), controlled and not controlled, for the regulation of motor speed.

Competences in accordance with STCW Code Section A-III/1:
6. Operate electrical, electronic and control systems. KUP 6.1 Electrical equipment

**Full-or-part-time:** 4h
Theory classes: 3h
Laboratory classes: 1h

## Harmonic and transient

**Description:**
Having knowledge about the operation of electrical distribution systems, generation plant, generators and their synchronization, and start motors. Rates of Harmonic Distortion (HD) and Total Harmonic Distortion (THD), for current and voltage.

Competences in accordance with STCW Code Section A-III/1:
6. Operate electrical, electronic and control systems. KUP 6.1 Electrical equipment

**Full-or-part-time:** 2h
Theory classes: 2h

## Protections

**Description:**
Having knowledge about the operation of electrical distribution systems, generation plant, generators and their synchronization, motors and starting associated control circuits. Protection and Measuring Equipment.

Competences in accordance with STCW Code Section A-III/1:
6. Operate electrical, electronic and control systems. KUPs 6.1 Electrical equipment and
7. Maintenance and repair of electrical and electronic equipment. KUP 7.1 to 7.4

**Full-or-part-time:** 4h
Theory classes: 3h
Laboratory classes: 1h
Industrial automation

**Description:**
Having knowledge about the operation of electrical distribution systems, generation plant, generators and their synchronization, motors and starting associated control circuits. Automation.

Competences in accordance with STCW Code Section A-III/1:
6. Operate electrical, electronic and control systems. KUPs 6.1 Electrical equipment and 7. Maintenance and repair of electrical and electronic equipment. KUP 7.1 to 7.4

**Full-or-part-time:** 4h
Theory classes: 4h

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**GRADING SYSTEM**
During the course there will be evaluations, according to the following percentages:
Continuous evaluations 30% (Exams Lab., Practices Lab., Expositions , Tasks)
Partial Exam 40%
Final Exam 30%

Reevaluation: Test that includes the concepts and objectives set for the final test.

**EXAMINATION RULES.**
Attendance and completion of the hands-on labs, is a compulsory requirement.

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**BIBLIOGRAPHY**

**Basic:**

**Complementary:**
RESOURCES

Computer material:
- Apunts, articles tècnics i models de simulació aportats pels professor en ATENEA.