280723 - Marine Renewable Energies and Energy Optimization

<table>
<thead>
<tr>
<th>Coordinating unit:</th>
<th>280 - FNB - Barcelona School of Nautical Studies</th>
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<tbody>
<tr>
<td>Teaching unit:</td>
<td>709 - DEE - Department of Electrical Engineering</td>
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<tr>
<td>Academic year:</td>
<td>2020</td>
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<tr>
<td>Degree:</td>
<td>MASTER'S DEGREE IN THE MANAGEMENT AND OPERATION OF MARINE ENERGY FACILITIES (Syllabus 2016). (Teaching unit Compulsory)</td>
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<td>ECTS credits:</td>
<td>5</td>
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<tr>
<td>Teaching languages:</td>
<td>Catalan, Spanish</td>
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Opening hours

Timetable: To be defined depending on the availability of students and professor.

Prior skills

Knowledge on electrical and energy systems.

Degree competences to which the subject contributes

Basic:

CB7. That the students can apply their knowledge and ability to solve problems in new or unfamiliar environments within broader (or multidisciplinary) contexts related to their study area.

CB8. Students should be able to integrate knowledge and handle the complexity of making judgments based on information that, being incomplete or limited, includes reflections on the responsibilities social and ethical linked to the application of their knowledge and judgments.

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CB10. Students must possess the learning skills that enable them to continue studying in a way that will be largely self-directed or autonomous.

Transversal:

CT2. SUSTAINABILITY AND SOCIAL COMMITMENT: Being aware of and understanding the complexity of the economic and social phenomena typical of a welfare society, and being able to relate social welfare to globalisation and sustainability and to use technique, technology, economics and sustainability in a balanced and compatible
At the end of the course, students:
- Should know the main characteristics of renewable generation and energy storage technologies to be included in ships, as well as the associated management systems.
- Should know and utilize mathematical expressions for the sizing of renewable generating systems and energy storage technologies in ships.
- Should know how to utilize tools for the modeling and simulation of electrical systems, including renewable generation and energy storage technologies in ships.
- Should know how to define a project related to the conceptualization, sizing and utilization of renewable generating systems and energy storage technologies in ships.

Learning objectives of the subject

To present and solve mathematical problems with the help (or not) of computers.
During the course, students should develop an individual project to apply the concepts presented in magistral classes. This consists on developing a project on the integration of renewable generating systems and energy storage technologies in a ship. At the end of the course, students should do an oral presentation for the results of the project.

Study load

| Total learning time: 45h | Hours large group: | 45h | 100.00% |
## Content

### 1. Presentation of the subject. Introduction to the electrical plant for ships with renewable generation and energy storage technologies. Calculation of representative magnitudes.  

<table>
<thead>
<tr>
<th>Learning time: 7h</th>
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<tbody>
<tr>
<td>Theory classes: 1h 30m</td>
<td>Guided activities: 0h 30m</td>
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<tr>
<td>Self study : 5h</td>
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**Description:**
Introduction to the subject and review of fundamental concepts for the proper development of the subject.

**Related activities:**
Selection of the topic for the project to be developed individually during the course.

**Specific objectives:**
To review fundamental concepts.

### 3. Management systems for renewable generation, energy storage and energy optimization.

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<tr>
<th>Learning time: 7h 30m</th>
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<tbody>
<tr>
<td>Theory classes: 4h</td>
<td>Guided activities: 0h 30m</td>
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<tr>
<td>Self study : 3h</td>
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**Description:**
Management and monitoring systems associated to the renewable generation and energy storage technologies are described.

**Related activities:**
Project to be developed individually. Short practical activities.

**Specific objectives:**
To identify management technologies in ships and its importance and functionality.
Qualification system

Final exam = 40%
Short practical activities = 20%
Project = 40%

Regulations for carrying out activities

The usage of calculator is needed for the final exam. Reports for practical activities can be elaborated in groups. The project should be done individually. It is mandatory to assist to the final exam.

Bibliography

Basic: