280723 - Marine Renewable Energies and Energy Optimization

Coordinating unit: 280 - FNB - Barcelona School of Nautical Studies
Teaching unit: 709 - DEE - Department of Electrical Engineering
Academic year: 2019
Degree: MASTER'S DEGREE IN THE MANAGEMENT AND OPERATION OF MARINE ENERGY FACILITIES (Syllabus 2016). (Teaching unit Compulsory)
MASTER'S DEGREE IN NAVAL AND OCEAN ENGINEERING (Syllabus 2017). (Teaching unit Optional)
ECTS credits: 5
Teaching languages: Catalan, Spanish

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Teaching staff
Coordinator: Fuses Navarra, Victor
Others: Fuses Navarra, Victor

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.
CB10. Students must possess the learning skills that enable them

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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.

**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 manner.

CT4. EFFECTIVE USE OF INFORMATION RESOURCES: Managing the acquisition, structuring, analysis and display of data and information in the chosen area of specialisation and critically assessing the results obtained.

CT5. FOREIGN LANGUAGE: Achieving a level of spoken and written proficiency in a foreign language, preferably English, that meets the needs of the profession and the labour market.

**Teaching methodology**

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.

**Learning objectives of the subject**

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.

**Study load**

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

| 1. Presentation of the subject. Introduction to the electrical plant for ships with renewable generation and energy storage technologies. Calculation of representative magnitudes. | Learning time: 7h  
Theory classes: 1h 30m  
Guided activities: 0h 30m  
Self study: 5h |
|---|---|
| **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. | Learning time: 7h 30m  
Theory classes: 4h  
Guided activities: 0h 30m  
Self study: 3h |
|---|---|
| **Description:**  
Main operating principles, characteristics, technologies that can be found in the market, basic calculations for dimensioning, description of simulation models. | |
| **Related activities:**  
Project to be developed individually. Short practical activities. | |
| **Specific objectives:**  
To gain knowledge on renewable generation and energy storage technologies. | |
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: