280652 - Propulsion

Coordinating unit: 280 - FNB - Barcelona School of Nautical Studies
Teaching unit: 742 - CEN - Department of Nautical Sciences and Engineering
Academic year: 2019
Degree: BACHELOR'S DEGREE IN MARINE TECHNOLOGIES (Syllabus 2010). (Teaching unit Compulsory)
ECTS credits: 4,5  Teaching languages: English

Teaching staff
Coordinator: JOEL JURADO GRANADOS
Others: Primer quadrimestre: JOEL JURADO GRANADOS - 1

Opening hours
Timetable: Timetable tutorials depends of the subject schedule

Degree competences to which the subject contributes

Specific:
2. Knowledge of marine propulsion and capacity for calculation, selection, installation and maintenance.

General:
1. ABILITY TO SHAPE, MANAGE AND IMPLEMENT COMPLEX SYSTEMS IN THE FIELD OF MARINE ENGINEERING. Ability to design, management and implementation of processes, systems and / or services in the field of marine engineering, including the development of projects in the field of specialization, knowledge of basic materials and technologies, decision making, the management of the activities under the project, conducting measurements, calculations and valuations, managing specifications, regulations and mandatory standards, assessment of the social and environmental impact of technical solutions, economic valuation and resource human and material involved in the project, with a systematic and inclusive vision.

ENG) CG9. ABILITY TO SHAPE, MANAGE AND IMPLEMENT COMPLEX SYSTEMS IN THE FIELD OF MARINE ENGINEERING. Ability to design, management and implementation of processes, systems and / or services in the field of marine engineering, including the development of projects in the field of specialization, knowledge of basic materials and technologies, decision making, the management of the activities under the project, conducting measurements, calculations and valuations, managing specifications, regulations and mandatory standards, assessment of the social and environmental impact of technical solutions, economic valuation and resource human and material involved in the project, with a systematic and inclusive vision.
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Teaching methodology
Lectures and resolution of problems. Exercises proposed by the teacher. Individual and team works. Tutorials.

Learning objectives of the subject
Learn the procedures to select a marine propeller. Understand the different propulsive systems nowadays and their needs. Then student must be able to apply the knowledge learned to assemble and maintenance of marine propellers and their propulsive system. Discern the different propulsive solutions. Make basic calculus of propeller design. Understand the cavitation phenomenon, problems involved and solutions to make. The student should be able to choose a main engine according to the needs and requirements of the vessel. Another purpose of this subject is give to the students the knowledge, understanding and aptitude of the competence of the Annex III of the Standards of Training, Certification and Watchkeeping Convention (STCW), regarding the item 11.2: Naval Construction and Ship Theory, and 11.7: Elementary Knowledge of the Main Structural Elements and the Correct Nomenclature of the Diverse Components.

Study load

<table>
<thead>
<tr>
<th>Total learning time: 112h 30m</th>
<th>Hours large group:</th>
<th>27h</th>
<th>24.00%</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Hours medium group:</td>
<td>14h</td>
<td>12.44%</td>
</tr>
<tr>
<td></td>
<td>Hours small group:</td>
<td>0h</td>
<td>0.00%</td>
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<tr>
<td></td>
<td>Guided activities:</td>
<td>4h</td>
<td>3.56%</td>
</tr>
<tr>
<td></td>
<td>Self study:</td>
<td>67h 30m</td>
<td>60.00%</td>
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## Content

| Lesson 1. Introduction to hydrodynamics. Components of the drag resistance. | Learning time: 11h 15m  
| Theory classes: 11h 15m |
|---|---|
| Description:  
Components of the drag resistance. Froude's theory.  
Viscous drag, wave drag and other components.  
Different types of vessels: conventional and non conventional vessels. |

| Lesson 2. Introduction to propellers. Fundamentals of propellers. | Learning time: 11h 15m  
| Theory classes: 11h 15m |
|---|---|
| Description:  
Introduction: parts of the propulsive machinery. Propeller geometry.  
Fundamentals: momentum theory, circulation theory and blade element theory. |

| Lesson 3. Propeller tests. Cavitation study. | Learning time: 11h 15m  
| Theory classes: 11h 15m |
|---|---|
| Description:  
Open-water test, autopropulsive test.  
Cavitation: phenomenon, reason and ways to appear, effects for the propeller, prevention. |

| Lesson 4. Propellers projects. Choosing a main engine. | Learning time: 11h 15m  
| Theory classes: 11h 15m |
|---|---|
| Description:  
Systematic series, optimal diameter, optimum speed.  
Types of propellers: controllable pitch propellers, waterjet, vertical axis propeller, supercavitants, pods.  
Study of the propulsive systems and its elements. operation, maintenance. Problems arisen in propulsive systems and their solutions. |
CONTINUOUS EVALUATION
Ncourse=0.40*P1+0.40*P2+0.20*Nt

Nt: marks of assignments done in groups and individually.
P1: first test. Lectures 1 and 2 will be evaluated.
P2: second test. Lectures 3 and 4 will be evaluated. This test will be done the last day of the course.
Final test: Those students that want improve their marks in any part of the P1 and P2 can do the final exam. The mark in those parts evaluated in the final exam, will be the final mark for each part.

REEVALUATION:
The reevaluation will be a written exam that comprises all the concepts seen during the course.

Regulations for carrying out activities
The tests during the course are divided into theoretical concepts and exercises. Each part of the test must have a minimum mark of 4.0
The student with a part below the 4.0 has to do again that part in the final exam of January.
If a part of the final exam has been done, the marks corresponding with each mark are used to calculate the final qualification.
The final exam of January makes average with the marks of the assignments. In the reevaluation exam, the assignment mark does not count for the final qualification.

Bibliography

Basic: