280718 - Thermal Engines

Coordinating unit: 280 - FNB - Barcelona School of Nautical Studies
Teaching unit: 742 - CEN - Department of Nautical Sciences and Engineering
Academic year: 2017
Degree: MASTER'S DEGREE IN THE MANAGEMENT AND OPERATION OF MARINE ENERGY FACILITIES (Syllabus 2016). (Teaching unit Compulsory)
ECTS credits: 5 Teaching languages: Spanish

Teaching staff
Coordinator: MANUEL RODRÍGUEZ CASTILLO

Degree competences to which the subject contributes

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

Specific:
CE11MEM. Manage the operations of fuel, lubrication and ballast

General:
CG8MEM. Acquire a critical independence. Defender of oral and written form their own ideas.

Transversal:
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.

Teaching methodology
Acquire, understand and synthesize knowledge.
And solve problems.
Prepare technical reports.
Adopt solutions in practical cases.
Making memory work.

Learning objectives of the subject
Explain the construction and functional characteristics of marine engines. Analyze the internal behavior of the motors.
Provide the knowledge necessary for analysis and diagnosis. Study of performance and power.
This course will evaluate the following STCW competences:
Manage the operation of propulsion plant machinery
Plan and schedule operations
Operation, surveillance, performance assessment and maintaining safety of propulsion plant and auxiliary machinery
Manage fuel, lubrication and ballast operations
## Study load

<table>
<thead>
<tr>
<th>Total learning time: 45h</th>
<th>Hours large group:</th>
<th>45h</th>
<th>100.00%</th>
</tr>
</thead>
</table>
# Content

## Analysis of power and performance

**Description:**
Description of the design features and working mechanisms of the main engines and auxiliary machinery.

**Learning time:** 16h
- Theory classes: 6h
- Self study: 10h

## Energy load

**Description:**
Description of the systems and the propulsion characteristics of diesel engines, including the speed, power and fuel consumption. Analysis of the operating limits of the propulsion installation.

**Learning time:** 16h
- Theory classes: 6h
- Self study: 10h

## Optimization and control

**Description:**
Functions and mechanisms of automatic control of the main motor. Operation and operation of main propulsion and auxiliary machinery, including associated systems.

**Learning time:** 16h
- Theory classes: 6h
- Self study: 10h

## Electronic injection

**Description:**
Functions and requirements of the injection devices. Functions and mechanisms of automatic control of the main motor.

**Learning time:** 17h
- Theory classes: 6h
- Self study: 11h

## Supercharger

**Description:**
Utility and boost modes. Supercharger of large two-stroke engines. Two-stage supercharging engines and low compression ratio.

**Learning time:** 17h
- Theory classes: 6h
- Self study: 11h
# 280718 - Thermal Engines

## Rotary engines

<table>
<thead>
<tr>
<th><strong>Learning time:</strong></th>
<th>17h</th>
</tr>
</thead>
<tbody>
<tr>
<td>Theory classes:</td>
<td>6h</td>
</tr>
<tr>
<td>Self study:</td>
<td>11h</td>
</tr>
</tbody>
</table>

**Description:**
Rotary engines, types and alternative fuels. Operating Principles: Wankel, Radmax, Quasiturbine, Round Engine, etc.

## Diagram Interpretation

<table>
<thead>
<tr>
<th><strong>Learning time:</strong></th>
<th>17h</th>
</tr>
</thead>
<tbody>
<tr>
<td>Theory classes:</td>
<td>6h</td>
</tr>
<tr>
<td>Self study:</td>
<td>11h</td>
</tr>
</tbody>
</table>

**Description:**
Obtaining, interpreting and analyzing diagrams. Analysis of the heat cycle, thermal efficiency and thermal balance of the motor.

## Polluting emissions

<table>
<thead>
<tr>
<th><strong>Learning time:</strong></th>
<th>17h</th>
</tr>
</thead>
<tbody>
<tr>
<td>Theory classes:</td>
<td>6h</td>
</tr>
<tr>
<td>Self study:</td>
<td>11h</td>
</tr>
</tbody>
</table>

**Description:**

## Faults and repairs

<table>
<thead>
<tr>
<th><strong>Learning time:</strong></th>
<th>17h</th>
</tr>
</thead>
<tbody>
<tr>
<td>Theory classes:</td>
<td>6h</td>
</tr>
<tr>
<td>Self study:</td>
<td>11h</td>
</tr>
</tbody>
</table>

**Description:**
Inspection, diagnosis and failure analysis of diesel engines.
Qualification system

The final score is the sum of the following partial grades:
\[ N_{\text{final}} = 0.6 \times N_{\text{pf}} + 0.4 \times N_{\text{ec}} \]

- \( N_{\text{final}} \): Final Rating
- \( N_{\text{pf}} \): Rated final test
- \( N_{\text{ec}} \): Course exercises

The final test consists of a part with issues related to the learning objectives of the course in terms of knowledge or understanding concepts, and a set of application exercises. Continuous assessment consists of various tests and formative activities, both individual and group, made during the course.

Regulations for carrying out activities

If you have not done laboratory activities, work or evaluation, is considered as punctuated. It is considered not submitted when not perform any of the tests.

Bibliography

**Basic:**

**Complementary:**