**280718 - Thermal Engines**

***Coordinating unit:*** 280 - FNB - Barcelona School of Nautical Studies  
***Teaching unit:*** 742 - CEN - Department of Nautical Sciences and Engineering  
***Academic year:*** 2018  
***Degree:*** MASTER’S DEGREE IN THE MANAGEMENT AND OPERATION OF MARINE ENERGY FACILITIES (Syllabus 2016). (Teaching unit Compulsory)  
***ECTS credits:*** 5  
***Teaching languages:*** Spanish

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### Degree competences to which the subject contributes

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

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

**Generical:**  
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.

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### Teaching methodology

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

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### 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 A-III/2 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

This knowledge is necessary in accordance with STCW A-III/2 and it's developed according to CHIEF ENGINEER OFFICER AND SECOND ENGINEER OFFICER (Model course 7.02) (2014 Edition)
## Study load

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

<table>
<thead>
<tr>
<th>Topic</th>
<th>Learning time</th>
<th>Description:</th>
<th>Specific objectives</th>
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</thead>
<tbody>
<tr>
<td><strong>Analysis of power and performance</strong></td>
<td>16h</td>
<td>Description of the design features and working mechanisms of the main engines and auxiliary machinery.</td>
<td>Manage the operation of propulsion plant machinery</td>
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<td>Design features, and operative mechanism of marine diesel engines and associated auxiliaries.</td>
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<td><strong>Energy load</strong></td>
<td>16h</td>
<td>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.</td>
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<tr>
<td><strong>Optimization and control</strong></td>
<td>16h</td>
<td>Functions and mechanisms of automatic control of the main motor. Operation and operation of main propulsion and auxiliary machinery, including associated systems.</td>
<td>Plan and schedule operations</td>
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<td>Thermodynamics and heat transfer Mechanics and hydromechanics</td>
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<td>Propulsive characteristics of diesel engines, including speed, power and fuel consumption</td>
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<td>Thermal cycle, thermal efficiency and thermal balance of marine diesel engine</td>
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<td>Physical and chemical properties of fuels and lubricants</td>
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<tr>
<td><strong>Electronic injection</strong></td>
<td>17h</td>
<td>Functions and requirements of the injection devices. Functions and mechanisms of automatic control of the main motor.</td>
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| **Supercharger** | **Learning time:** 17h  
Theory classes: 6h  
Self study: 11h |
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<tbody>
<tr>
<td><strong>Description:</strong> Utility and boost modes. Supercharger of large two-stroke engines. Two-stage supercharging engines and low compression ratio.</td>
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| **Rotary engines** | **Learning time:** 17h  
Theory classes: 6h  
Self study: 11h |
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<tbody>
<tr>
<td><strong>Description:</strong> Rotary engines, types and alternative fuels. Operating Principles: Wankel, Radmax, Quasiturbine, Round Engine, etc.</td>
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| **Diagram Interpretation** | **Learning time:** 17h  
Theory classes: 6h  
Self study: 11h |
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<tbody>
<tr>
<td><strong>Description:</strong> Obtaining, interpreting and analyzing diagrams. Analysis of the heat cycle, thermal efficiency and thermal balance of the motor.</td>
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| **Polluting emissions** | **Learning time:** 17h  
Theory classes: 6h  
Self study: 11h |
|------------------------|-------------------|
Operation, faults and repairs

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

Specific objectives:
- Operation, surveillance, performance assessment and maintaining safety of propulsion plant and auxiliary machinery
- Start up and shut down main propulsion and auxiliary machinery, including associated systems
- Operating limits of propulsion plant
- The efficient operation, surveillance, performance assessment and maintaining safety of propulsion plant and auxiliary machinery
- Manage fuel, lubrication and ballast operations
- Operation and maintenance of machinery, including pumps and piping systems

Qualification system

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

- Nfinal: Final Rating
- Npf: Rated final test
- Nec: Course exercises and workshop practices

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.
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Bibliography

Basic:


Complementary:


