Degree competences to which the subject contributes

Specific:
1. Knowledge of the fundamentals of Fluid Mechanics machines and systems, internal combustion engines, steam turbines and gas, steam generators, cooling and air conditioning.
2. Ability to design and manage energy optimization systems applied to marine installations.

Transversal:
1. SUSTAINABILITY AND SOCIAL COMMITMENT - Level 2. Applying sustainability criteria and professional codes of conduct in the design and assessment of technological solutions.

Learning objectives of the subject

Theoretical and practical understanding of the operation of internal combustion engines.
Knowledge of various types and facilities on board.
Knowledge of computing powers, jobs, income, consumption, etc..
Understand the concept of life cycle of a product and apply it to the development of products and services in the field of marine engineering, using appropriate laws and regulations.

On the other hand, one of the objectives of this subject is provide the knowledge, understanding and proficiency of the competency STCW, Annex III:

2. Use hand tools and measuring equipment for dismantling, maintenance, repair and installation of systems and equipment on board.
2.3 Operational characteristics of equipment and systems.

4. Perform a safe engineering watch.
4.3 The safety precautions to be taken during the watch and the measures to be applied in case of fire or accident, with particular reference to the fuel.

6. Operate main and auxiliary machine and caesarean systems control.
6.1 Main and auxiliary machinery:
6.1.1 Preparation before operation of the main and auxiliary machinery.

9. Keeping marine engineering systems, including control systems.
9.1 marine engineering systems.
9.2 Have appropriate basic mechanical knowledge.

This course will evaluate the following STCW competences:
4. Operate main and auxiliary machinery and associated control systems
7. Maintenance and repair of electrical and electronic equipment
9. Maintenance and repair of shipboard machinery and equipment

<table>
<thead>
<tr>
<th>Study load</th>
<th>Hours large group:</th>
<th>50h</th>
<th>22.22%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total learning time: 225h</td>
<td>Hours medium group:</td>
<td>20h</td>
<td>8.89%</td>
</tr>
<tr>
<td></td>
<td>Hours small group:</td>
<td>10h</td>
<td>4.44%</td>
</tr>
<tr>
<td></td>
<td>Guided activities:</td>
<td>10h</td>
<td>4.44%</td>
</tr>
<tr>
<td></td>
<td>Self study:</td>
<td>135h</td>
<td>60.00%</td>
</tr>
</tbody>
</table>
## Content

| Application and classification of internal combustion engines (MCI). | **Learning time:** 6h  
Theory classes: 6h |
|---|---|
| **Description:**  
Study on the different applications of internal combustion engines and ranking. |

| Fundamental concepts and general definitions of MCI. | **Learning time:** 6h  
Theory classes: 6h |
|---|---|
| **Description:**  
Schematic and nomenclature of the reciprocating engine. The engine ignition. The compression ignition engine. Differences between MECh and MEC. Working fluid. |

| Thermal cycles. | **Learning time:** 6h  
Theory classes: 6h |
|---|---|
| **Description:**  

| Engine operating cycles two and four times. | **Learning time:** 6h  
Theory classes: 6h |
|---|---|
| **Description:**  
Indicated cycle and mean pressure indicated. Differences between actual and theoretical cycles. Study diagram indicated. Pressure diagram. |

| Organizational study of the engine. | **Learning time:** 6h  
Theory classes: 6h |
|---|---|
| **Description:**  
**Specific objectives:**  
2. Use hand tools and measuring equipment for dismantling, maintenance, repair and installation of systems and equipment on board.  
2.3 Operational characteristics of equipment and systems. |
<table>
<thead>
<tr>
<th>Topic</th>
<th>Learning time: 6h</th>
<th>Theory classes: 6h</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Calculation of powers, yields and consumptions.</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Description:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Indicated power. Effective power. Power absorbed by passive resistance. Mean effective pressure. Yields.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| **Engine performance and factors that influence it.** |                   |                    |
| **Description:**                                    |                   |                    |
| **Specific objectives:**                           |                   |                    |
| 6. Operate main and auxiliary machine and caesarean systems control. |                   |                    |
| 6.1 Main and auxiliary machinery:                  |                   |                    |
| 6.1.1 Preparation before operation of the main and auxiliary machinery. |                   |                    |
| 9. Keeping marine engineering systems, including control systems. |                   |                    |
| 9.1 marine engineering systems.                    |                   |                    |
| 9.2 Have appropriate basic mechanical knowledge.    |                   |                    |

| **Combustion and Fuels.**                          |                   |                    |
| **Description:**                                   |                   |                    |

| **Lubrication.**                                  |                   |                    |
| **Description:**                                  |                   |                    |
## Forming the mixture.

**Learning time:** 6h  
Theory classes: 6h

**Description:**  
Injection. Injection systems and elements.  

## Refrigeration.

**Learning time:** 6h  
Theory classes: 6h

**Description:**  
Refrigerants. Systems and cooling elements.  

## Scavenging

**Learning time:** 6h  
Theory classes: 6h

**Description:**  

## Motor starting.

**Learning time:** 6h  
Theory classes: 6h

**Description:**  
Systems and startup items. Reversible motors.  

## Supercharger.

**Learning time:** 6h  
Theory classes: 6h

**Description:**  
Supercharging systems and components.  
The final score is the sum of the following partial grades:

\[ N_{\text{final}} = 0.7 \, N_{\text{pf}} + 0.3 \, N_{\text{elt}} \]

- \( N_{\text{final}} \): final grade.
- \( N_{\text{pf}} \): final test score.
- \( N_{\text{elt}} \): scores of teaching and laboratory work.

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.

The rating of teaching and laboratory work will consist of technical reports delivery practices and / or jobs.

A final test will be conducted reassessment students who meet the requirements established by the regulations of the center, which will consist of a single test in which all of the matter that will be assessed during the course.

### Qualification system

### Regulations for carrying out activities

If you have not done laboratory activities, work or evaluation, is considered not scored.

It is considered not submitted when not perform any tests.
Bibliography

Basic:


Complementary: