280619 - Ship Theory and Naval Construction

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 NAUTICAL SCIENCE AND MARITIME TRANSPORT (Syllabus 2010).
(Eating unit Compulsory)
ECTS credits: 9
Teaching languages: Catalan, Spanish

Teaching staff

Coordinator: JORGE MONCUNILL MARIMON
Others: Primer quadrimestre:
    FAICAL EL MACHHOUR - 1
    JORGE MONCUNILL MARIMON - 1

Opening hours

Timetable: FAICAL EL MACHHOUR. 10:00 a 12:00 Thursday and de 12:00 a 14:00 Friday
           JORGE MONCUNILL MARIMON. 17:00 a 18:30 Friday

Requirements

Having passed the course of “Ship Stability” Q4 Grade Nautical and Maritime Transport or this subject should be in compensated conditions at the end of the cycle.

Degree competences to which the subject contributes

Specific:

Teaching methodology

- Receive, understand and synthesize knowledge.
- Solve problems.
- Develop the reasoning and critical thinking

Learning objectives of the subject

- Know the issues of flooding and grounding
- Understand the effects of movement as well the dynamics of marine vehicles.
- Mastering the concepts of resistance and marine propulsion.
- Be able to calculate the stresses to which the structure is subjected to a ship.
- Know the different typologies of ships and structures.
- Understand the operation of Classification Societies and the different systems of maritime inspections.

On the other hand, one of the objectives of this subject is provide the knowledge, understanding and proficiency of the competency "Respond to emergencies" of Table A-II/1-5 and the competency "Respond to navigational emergencies" of Table A-II/2-9 and "Control Trim, stability and Stress" of Table A-II/2-15 of the Seafarers, Training, Certification and Watchkeeping (STCW) International Code.

### Study load

<table>
<thead>
<tr>
<th></th>
<th>Hours large group:</th>
<th>Hours medium group:</th>
<th>Hours small group:</th>
<th>Guided activities:</th>
<th>Self study:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total learning time:</td>
<td>225h</td>
<td>45h</td>
<td>45h</td>
<td>0h</td>
<td>135h</td>
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<td>0.00%</td>
<td>60.00%</td>
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</tbody>
</table>
## Content

<table>
<thead>
<tr>
<th>Chapter 1. Distribution of cargo between two holds</th>
<th>Learning time: 10h</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Theory classes: 6h</td>
</tr>
<tr>
<td></td>
<td>Self study: 4h</td>
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</tbody>
</table>

**Description:**
In this chapter the distribution of cargo between two or more holds will be studied.

<table>
<thead>
<tr>
<th>Chapter 2. Relationship between the type of ship and her stability</th>
<th>Learning time: 37h 30m</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Theory classes: 15h</td>
</tr>
<tr>
<td></td>
<td>Self study: 22h 30m</td>
</tr>
</tbody>
</table>

**Description:**
Knowledge of IMO recommendations concerning ship stability (A-II/2-15.3) and explore the characteristics of stability according to the type of vessel: tankers, fishing vessels, icebreakers, high speed crafts, among others. Understanding of fundamental principles of ship construction and the theories and factors affecting trim and stability and measures necessary to preserve trim and stability (this knowledge is necessary in accordance with STCW Code Table A-II/2-15.1)

<table>
<thead>
<tr>
<th>Chapter 3. Bulk grain loading</th>
<th>Learning time: 20h</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Theory classes: 4h</td>
</tr>
<tr>
<td></td>
<td>Practical classes: 4h</td>
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<tr>
<td></td>
<td>Self study: 12h</td>
</tr>
</tbody>
</table>

**Description:**
- Background Information concerning bulk grain
- Calculations of volumetric heeling moments
- Stability regulations for loading bulk grain

<table>
<thead>
<tr>
<th>Chapter 4. Optimum trim</th>
<th>Learning time: 7h 30m</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Theory classes: 4h</td>
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<tr>
<td></td>
<td>Self study: 3h 30m</td>
</tr>
</tbody>
</table>

**Description:**
Study of the optimum trim of the vessel for fuel consumption efficiency.
# Chapter 5. Stabilizer systems

**Learning time:** 12h 30m  
Theory classes: 5h  
Self study: 7h 30m

**Description:**  
Description of the classification and functionality of the different stabilizer systems

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# Chapter 6. Grounding

**Learning time:** 25h  
Theory classes: 5h  
Practical classes: 5h  
Self study: 15h

**Description:**  
- Overview. Initial action to be taken following a collision or a grounding; initial damage assessment and control (Table A-II/1-5.2 STCW code)  
- Calculate the reaction  
- Effect of grounding on the drafts, transverse stability and heel  
- Precautions when beaching a ship (Table A-II/2-9.1 STCW code)  
- Action to be taken if grounding is imminent, and after grounding (Table A-II/2-9.2 STCW code)  
- Refloating a grounded ship with and without assistance (Table A-II/2-9.3 STCW code)  
- Drydocking

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# Chapter 7. Flooding

**Learning time:** 37h 30m  
Theory classes: 5h  
Practical classes: 5h  
Self study: 22h 30m

**Description:**  
- Types of flooding.  
- Methods of calculation of the flood.  
- Effects of flooding on the drafts, list and stability.  
- Action to be taken if collision is imminent and following a collision or impairment of the watertight integrity of the hull by any cause (Table A-II/2-9.4 Code STCW)  
- Knowledge of the effect on trim and stability of a ship in the event of damage to and consequent flooding of a compartment and counter measures to be taken (Table A-II/2-15.2 Code STCW).
The final score is the sum of the following partial grades:

\[ N_{\text{final}} = 0.67N_{\text{ss}} + 0.33N_{\text{c}} \]

- \( N_{\text{final}} \): final score
- \( N_{\text{ss}} \): final score ship stability theme
- \( N_{\text{c}} \): final score naval construction theme

From both parts, there will be some partial exams during the course and continuous assessment.

The act of re-evaluation will be done through a final exam where all the course material will be assessed.
Regulations for carrying out activities

- You can't pass the course if all work activities and continuous assessment are carried out and submitted.
- If the student does not carried out partial and/or final exam, he or she will be considered as: Not Presented
- In any case, the student can use any kind of predesigned form in controls or tests.

Bibliography

Basic:

Olivella Puig, Joan. Teoría del buque : estabilidad, varada e inundación [on line]. Barcelona: Edicions UPC, 1996


Olivella Puig, Joan. Teoría del buque : flotabilidad y estabilidad [on line]. 2a ed. Barcelona: Edicions UPC, 1995 [Consultation:


Complementary:

9870750667845.

Pursey, H. J. Merchant ship construction : especially written for the merchant navy. 7a ed. Glasgow: Brown, Son & Ferguson,