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: 2017
Degree: BACHELOR'S DEGREE IN NAUTICAL SCIENCE AND MARITIME TRANSPORT (Syllabus 2010).
(Teaching unit Compulsory)
ECTS credits: 9
Teaching languages: Catalan, Spanish

Teaching staff
Coordinator: MARCEL·LA CASTELLS SANABRA
Others: MARCEL·LA CASTELLS SANABRA
JESÚS EZEQUIEL MARTÍNEZ MARÍN

Opening hours
Timetable: MARCEL·LA CASTELLS i SANABRA. 10:00 a 12:00 Thursday and de 12:00 a 14:00 Friday
JESÚS EZEQUIEL MARTÍNEZ MARÍN. 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 to provide the knowledge, understanding and proficiency of the competency "Respond to emergencies" of Table AII/1 and the competency "Respond to navigational emergencies" and "Control Trim, stability and Stress" of Table AII/2 of the Seafarers, Training, Certification and Watchkeeping (STCW) International Code.

<table>
<thead>
<tr>
<th>Study load</th>
<th>Hours large group</th>
<th>45h</th>
<th>20.00%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total learning time:</td>
<td>Hours medium group</td>
<td>45h</td>
<td>20.00%</td>
</tr>
<tr>
<td></td>
<td>Hours small group</td>
<td>0h</td>
<td>0.00%</td>
</tr>
<tr>
<td></td>
<td>Guided activities</td>
<td>0h</td>
<td>0.00%</td>
</tr>
<tr>
<td></td>
<td>Self study:</td>
<td>135h</td>
<td>60.00%</td>
</tr>
</tbody>
</table>
## Content

<table>
<thead>
<tr>
<th>Chapter</th>
<th>Title</th>
<th>Learning time</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Distribution of cargo between two holds</td>
<td>10h</td>
<td>In this chapter the distribution of cargo between two or more holds will be studied.</td>
</tr>
<tr>
<td>2</td>
<td>Relationship between the type of ship and her stability</td>
<td>37h 30m</td>
<td>This chapter will explore the characteristics of stability according to the type of vessel: tankers, fishing vessels, icebreakers, high speed crafts, among others.</td>
</tr>
<tr>
<td>3</td>
<td>Bulk grain loading</td>
<td>20h</td>
<td>Study of the optimum trim of the vessel for fuel consumption efficiency.</td>
</tr>
<tr>
<td>4</td>
<td>Optimum trim</td>
<td>7h 30m</td>
<td></td>
</tr>
</tbody>
</table>

### Chapter 1. Distribution of cargo between two holds

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

### Chapter 2. Relationship between the type of ship and her stability

### Chapter 3. Bulk grain loading

- Theory classes: 4h
- Practical classes: 4h
- Self study: 12h

### Chapter 4. Optimum trim

- Theory classes: 4h
- Self study: 3h 30m
### Chapter 5. Stabilizer systems

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

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

### Chapter 6. Grounding

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

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

### Chapter 7. Flooding

**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 AII/2 Code STCW)

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

### Chapter 8. Historical approach: evolution of the Naval Shipbuilding

**Description:**
Study of the history of the Naval construction and analysis of the evolution of the different modes of transport over time.

**Learning time:** 25h
- Theory classes: 10h
- Self study: 15h
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.

### Qualification system

#### 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.

### Chapter 9. Evolution of Naval Propulsion from sail to steam. Naval engines

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

**Description:**
- Basic study of sail propulsion, analysis and development of the steam engine and its adaptation to ships.
- Study of the naval engines and their development.
- Flettner propulsion, technological development and application to marine engines.

### Chapter 10. The ship as a beam: welding in shipbuilding, mounting and dismounting and care/protection of the ship.

**Learning time:** 25h
- Theory classes: 10h
- Practical classes: 0h
- Self study: 15h

**Description:**
- Study of different forms of welding in shipbuilding, study of corrosion, and protection of vessels.

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Bibliography

Basic:


Complementary:

