280615 - Ship Theory

Coordinating unit: 280 - FNB - Barcelona School of Nautical Studies
Teaching unit: 742 - CEN - Department of Nautical Sciences and Engineering
Academic year: 2018
Degree: BACHELOR'S DEGREE IN NAUTICAL SCIENCE AND MARITIME TRANSPORT (Syllabus 2010).
(Teaching unit Compulsory)
ECTS credits: 6  
Teaching languages: Catalan, Spanish

Degree competences to which the subject contributes

Specific:
1. Knowledge, use and application of the ship from the principles of the theory of the ship.

Teaching methodology

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

Learning objectives of the subject

Reach a good understanding of the principles of buoyancy and stability of the vessel. The student begins to calculate weight movements, stability and vessel drafts.

On the other hand, one of the objectives of this subject is provide the knowledge, understanding and proficiency of the competency "Maintain seaworthiness of the ship"(A-II/1-13), and part of the competency "Monitor the loading, stowage, securing, care during the voyage and the unloading of cargoes"(A-II/1-10), competencies required and defined in Section A-II/1 (Mandatory minimum requirements for certification of officers in charge of a navigational watch on ships of 500 gross tonnage or more) of the Seafarers' Training, Certification and Watchkeeping (STCW) International Code.
### Study load

<table>
<thead>
<tr>
<th>Total learning time: 150h</th>
<th>Hours large group: 30h</th>
<th>20.00%</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Hours medium group: 20h</td>
<td>13.33%</td>
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<tr>
<td></td>
<td>Hours small group: 0h</td>
<td>0.00%</td>
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<tr>
<td></td>
<td>Guided activities: 10h</td>
<td>6.67%</td>
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<tr>
<td></td>
<td>Self study: 90h</td>
<td>60.00%</td>
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</table>
## Content

<table>
<thead>
<tr>
<th>Chapter 1. Definitions</th>
<th>Learning time: 16h</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Theory classes: 6h</td>
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<td>Self study : 10h</td>
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</table>

**Description:**

Understanding of the fundamentals of watertight integrity (this knowledge is necessary in accordance with Table A-II/1-13.1.3 of STCW Code)

<table>
<thead>
<tr>
<th>Chapter 2. Approximate methods to calculate buoyancy and stability.</th>
<th>Learning time: 26h</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Practical classes: 6h</td>
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<tr>
<td></td>
<td>Guided activities: 10h</td>
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<tr>
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<td>Self study : 10h</td>
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</tbody>
</table>

**Description:**
Calculation of areas, moments, centers of gravity, inertia and volumes. Method of trapezoids and the Simpson's first rule.

<table>
<thead>
<tr>
<th>Chapter 3. Tonnage and maximum load lines.</th>
<th>Learning time: 13h</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Theory classes: 2h</td>
</tr>
<tr>
<td></td>
<td>Practical classes: 1h</td>
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<tr>
<td></td>
<td>Self study : 10h</td>
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</table>

**Description:**

<table>
<thead>
<tr>
<th>Chapter 4. Drafts</th>
<th>Learning time: 14h</th>
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<tbody>
<tr>
<td></td>
<td>Theory classes: 2h</td>
</tr>
<tr>
<td></td>
<td>Practical classes: 2h</td>
</tr>
<tr>
<td></td>
<td>Self study : 10h</td>
</tr>
</tbody>
</table>

**Description:**
### Chapter 5. Centre of Gravity

**Learning time:** 14h  
Theory classes: 2h  
Practical classes: 2h  
Self study: 10h

**Description:**  
Weight movements. Using moments to find the center of gravity. TPC

### Chapter 6. Center of Buoyancy

**Learning time:** 14h  
Theory classes: 2h  
Practical classes: 2h  
Self study: 10h

**Description:**  
Isocarenas and isoclines, definition. Properties of the center of buoyancy. Properties of the submerged volume curve.

### Chapter 7. Initial stability

**Learning time:** 18h  
Theory classes: 6h  
Practical classes: 2h  
Self study: 10h

**Description:**  
The final score is the sum of the following partial grades:

\[ N_{\text{final}} = N_{\text{pf}} \times 0.4 + N_{\text{pp}} \times 0.4 + 0.2 \times N_{\text{ac}} \]

- \( N_{\text{final}} \): final score
- \( N_{\text{pf}} \): final exam
- \( N_{\text{pp}} \): partial exam
- \( N_{\text{ac}} \): continuous assessment

Partial and final exam consists of some issues associated with the learning objectives of the course so that respects the knowledge and understanding concepts, and a set of application exercises. The continuous assessment consists of different activities cumulative and formative character, both individual and group, made during the course.

Criteria for evaluating STCW A-II/1.13 and STCW A-II/1.10 competences: The stability conditions comply with the IMO intact stability criteria under all conditions of loading. Actions to ensure and maintain the watertight integrity of the ship are in accordance with accepted practice.

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

### Chapter 8. Stability at large angles of inclination

**Learning time:** 22h
- Theory classes: 6h
- Practical classes: 6h
- Self study: 10h

**Description:**
ATWOOD formula. KN Curves. Free surfaces. Stability curves. Analyzing a statical stability curve. Working knowledge and application of stability, trim and stress tables, diagrams and stress-calculating equipment. (This knowledge is necessary in accordance with Table A-II/1-13.1 of STCW Code).

Understanding of fundamental actions to be taken in the event of partial loss of intact buoyancy. (This knowledge is necessary in accordance with Table A-II/1-13.2 of STCW Code).

Knowledge of the effect of cargo, including heavy lifts, on the seaworthiness and stability of the ship. (This knowledge is necessary in accordance with Table A-II/1-10.1 of STCW Code).

### Chapter 9. Dynamical stability

**Learning time:** 13h
- Theory classes: 1h
- Practical classes: 2h
- Self study: 10h

**Description:**
Definition and calculation. Stability criteria.

### Qualification system
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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:


Complementary:

