280644 - Ship Theory

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 MARINE TECHNOLOGIES (Syllabus 2010). (Teaching unit Compulsory)
BACHELOR'S DEGREE IN NAVAL SYSTEMS AND TECHNOLOGY ENGINEERING (Syllabus 2010).
(Teaching unit Compulsory)
BACHELOR'S DEGREE IN MARINE TECHNOLOGIES/BACHELOR'S DEGREE IN NAVAL SYSTEMS AND TECHNOLOGY ENGINEERING (Syllabus 2016). (Teaching unit Compulsory)
ECTS credits: 6
Teaching languages: Catalan, Spanish

Teaching staff
Coordinator: MARCEL·LA CASTELLS SANABRA
Ortigosa Barragán, Inmaculada
Others: INMA ORTIGOSA BARRAGÁN

Opening hours
Timetable: Marcel·la Castells. From 12 to 14 Monday, From 10:00 to 12:00 Tuesday and from 12:00 to 14:00 Friday
Inma Ortigosa: From 12:00 to 14:00 Tuesday

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.
2. Knowledge of the fundamental concepts of fluid mechanics and its application to the hulls of ships and artifacts, and machines, equipment and naval systems.

Teaching methodology
- Receive, understand and synthesize knowledge.
- Solve problems.
- Develop the reasoning and critical Thinking.
- Incorporate the gender perspective.

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-III/1-11), competency required and defined in Section A-III/1 of the Seafarers' Training, Certification and Watchkeeping (STCW) International Code.

This course is included in the first UPC Gender and Teaching Project whose main aim is to incorporate the gender...
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perspective in different degree courses.

<table>
<thead>
<tr>
<th>Study load</th>
<th>Hours large group:</th>
<th>30h</th>
<th>20.00%</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Hours medium group:</td>
<td>15h</td>
<td>10.00%</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>15h</td>
<td>10.00%</td>
</tr>
<tr>
<td></td>
<td>Self study:</td>
<td>90h</td>
<td>60.00%</td>
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</tbody>
</table>
## Content

<table>
<thead>
<tr>
<th>Chapter</th>
<th>Description</th>
<th>Learning time</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Chapter 2. Approximate methods to calculate buoyancy and stability.</strong></td>
<td>Calculation of areas, moments, centers of gravity, inertia and volumes. Method of trapezoids and the Simpson's first rule.</td>
<td><strong>Learning time:</strong> 26h</td>
<td></td>
</tr>
<tr>
<td><strong>Chapter 3. Tonnage and maximum load lines.</strong></td>
<td>Definition of tonnage. Moorsom system. IMO system. Shelter-Deck Ship. Maximum load lines. Zones and seasonal periods. Maximum permissible drafts.</td>
<td><strong>Learning time:</strong> 13h</td>
<td></td>
</tr>
<tr>
<td><strong>Chapter 4. Drafts</strong></td>
<td>Laws of flotation. Trim correction. Trim. Calculation of fore and aft trim. Calculation of fore and aft alteration. TPC and displacement curves. Effect of change of density on draft and trim. River problems.</td>
<td><strong>Learning time:</strong> 14h</td>
<td></td>
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</tbody>
</table>
## 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:**  
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## Chapter 8. Stability at large angles of inclination

<table>
<thead>
<tr>
<th>Learning time: 22h</th>
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<tbody>
<tr>
<td>Theory classes: 6h</td>
</tr>
<tr>
<td>Practical classes: 6h</td>
</tr>
<tr>
<td>Self study: 10h</td>
</tr>
</tbody>
</table>

**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-III/1-11.1 of STCW Code).

Understanding of the fundamentals of watertight integrity. (This knowledge is necessary in accordance with Table A-III/1-11.2 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-III/1-11.3 of STCW Code).

## Chapter 9. Dynamical stability

<table>
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<tr>
<th>Learning time: 13h</th>
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<tbody>
<tr>
<td>Theory classes: 1h</td>
</tr>
<tr>
<td>Practical classes: 2h</td>
</tr>
<tr>
<td>Self study: 10h</td>
</tr>
</tbody>
</table>

**Description:**
- Definition and calculation.

- Stability criteria.

## Qualification system

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

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

- **Nfinal:** final score
- **Npf:** final exam
- **Npp:** partial exam
- **Nac:** 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-III/1-11: 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.
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 carry 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:


