Course guide
280644 - 280644 - Ship Theory

Unit in charge: Barcelona School of Nautical Studies
Teaching unit: 742 - CEN - Department of Nautical Sciences and Engineering.
Degree: BACHELOR'S DEGREE IN MARINE TECHNOLOGIES (Syllabus 2010). (Compulsory subject).
BACHELOR'S DEGREE IN NAVAL SYSTEMS AND TECHNOLOGY ENGINEERING (Syllabus 2010). (Compulsory subject).
Academic year: 2022  ECTS Credits: 6.0  Languages: Catalan, Spanish

LECTURER

Coordinating lecturer: MARCEL-LA CASTELLS SANABRA
Others: Segon quadrimestre: MARCEL-LA CASTELLS SANABRA - DT, GESTN, GTM INMACULADA ORTIGOSA BARRAGÁN - DT, GESTN, GTM

DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

Specific:
GTM.CE14. Knowledge, use and application of the ship from the principles of the theory of the ship.
GESTN.CE7. Knowledge of the fundamental concepts of fluid mechanics and its application to the hulls of ships and artifacts, and machines, equipment and naval systems.

STCW:
ME.1. A-III/1-4. Function: Controlling the operation of the ship and care for persons on board at the operational level
ME.2. A-III/1-4.2 Maintain seaworthiness of the ship
ME.3. A-III/1-KUP 4.2.1.1 Ship stability: Working knowledge and application of stability, trim and stress tables, diagrams and stress calculating equipment
ME.4. A-III/1-KUP 4.2.1.2 Ship stability: Understanding of the fundamentals of watertight integrity
ME.5. A-III/1-KUP 4.2.1.3 Ship stability: Understanding of fundamental actions to be taken in the event of partial loss of intact buoyancy

TEACHING METHODOLOGY

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

LEARNING OBJECTIVES OF THE SUBJECT

The student, once the course is finished, will be able to demonstrate that:
· Knows, uses and applies the principles of ship theory.
· It is capable of solving any type of problem associated with the theory of the ship on board.
· Find a practical and real relationship of the matter in the job entrusted to him on board ships.
· Identify, model and pose problems from open situations. Explore and apply the alternatives for its resolution.

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

<table>
<thead>
<tr>
<th>Type</th>
<th>Hours</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hours medium group</td>
<td>15,0</td>
<td>10.00</td>
</tr>
<tr>
<td>Hours large group</td>
<td>30,0</td>
<td>20.00</td>
</tr>
<tr>
<td>Self study</td>
<td>90,0</td>
<td>60.00</td>
</tr>
<tr>
<td>Guided activities</td>
<td>15,0</td>
<td>10.00</td>
</tr>
</tbody>
</table>

**Total learning time:** 150 h

CONTENTS

### Chapter 1. Definitions

**Description:**

**Full-or-part-time:** 16h
- Theory classes: 6h
- Self study: 10h

### Chapter 2. Approximate methods to calculate buoyancy and stability.

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

**Full-or-part-time:** 26h
- Practical classes: 6h
- Guided activities: 10h
- Self study: 10h

### Chapter 3. Tonnage and maximum load lines.

**Description:**

**Full-or-part-time:** 13h
- Theory classes: 2h
- Practical classes: 1h
- Self study: 10h

### Chapter 4. Drafts

**Description:**

**Full-or-part-time:** 14h
- Theory classes: 2h
- Practical classes: 2h
- Self study: 10h
Chapter 5. Centre of Gravity

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

Full-or-part-time: 14h
Theory classes: 2h
Practical classes: 2h
Self study : 10h

Chapter 6. Center of Buoyancy

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

Full-or-part-time: 14h
Theory classes: 2h
Practical classes: 2h
Self study : 10h

Chapter 7. Initial stability

Description:

Full-or-part-time: 18h
Theory classes: 6h
Practical classes: 2h
Self study : 10h

Chapter 8. Stability at large angles of inclination

Description:

Related competencies:
A31-4.2.1a. A-III/1-KUP 4.2.1.1 Ship stability: Working knowledge and application of stability, trim and stress tables, diagrams and stress-calculating equipment
A31-4.2.1b. A-III/1-KUP 4.2.1.2 Ship stability: Understanding of the fundamentals of watertight integrity
A31-4.2.1c. A-III/1-KUP 4.2.1.3 Ship stability: Understanding of fundamental actions to be taken in the event of partial loss of intact buoyancy

Full-or-part-time: 22h
Theory classes: 6h
Practical classes: 6h
Self study : 10h
Chapter 9. Dynamical stability

Definition and calculation. Stability criteria.

Full-or-part-time: 13h
Theory classes: 1h
Practical classes: 2h
Self study: 10h

GRADING SYSTEM

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

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

- \( N_{final} \): final score
- \( N_{pf} \): final exam
- \( N_{pp} \): partial exam
- \( N_{ac} \): 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-III/1: 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.

EXAMINATION RULES.

You can't pass the course if all work activities and continuous assessment are carried out and submitted.

The exam average must be at least 4, to compute the final mark of the subject. (Systems And MUENO group)

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 pre-designed form in controls or tests.

BIBLIOGRAPHY

Basic:

Complementary:
- Acanfora, María; Cirillo, Antonio. "On the intact stability of a ship in head and following sea: an analysis of the dynamic roll angle..."