

## SUBJECT TEACHING GUIDE

G1077 - Ship Theory and Naval Construction I

Degree in Marine Engineering

Academic year 2018-2019

1. IDENTIFYING DATA					
Degree	Degree in Marine Engineering			Type and Year	Compulsory. Year 2
Faculty	School of Maritime Engineering				
Discipline	Subject Area: Ship Theory Module: Marine and Nautical Training				
Course unit title and code	G1077 - Ship Theory and Naval Construction I				
Number of ECTS credits allocated	6	Term	Semester based (1)		
Web					
Language of instruction	Spanish	English Friendly	No	Mode of delivery	Face-to-face

Department	DPTO. CIENCIAS Y TECNICAS DE LA NAVEGACION Y DE LA CONSTRUCCION NAVAL				
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Other lecturers	JOSE IVAN MARTINEZ GARCIA				

### 3.1 LEARNING OUTCOMES

- After the necessary theoretical study know how to solve exercises in Ship Construction and Ship Theory.
- Know how to determine ship displacement and consequently the amount of cargo in a ship taken into account ship drafts and the specific gravity of water.
- Knowing the ship geometry and the relation among her notable points. Knowing stability cross curves and the stability calculations. Knowing the effect on stability that generate shifts or movements of weights on board . Knowing the effect of upsetting moments.
- Knowing the international regulations on ship load lines and ship tonnage.
- Knowing how to determine the ship transverse stability and checking the compliance with the established stability criteria.
- Knowing how a ship is built, her structure and types of ships.
- Knowing the application of fluid mechanics to vessels (ship hulls and naval crafts) and ship propulsion.
- Knowing how to maintain seaworthiness of the ship, in accordance with the Rules II-1 and III-1 of the STCW International Convention as amended
- Knowing how to plan and schedule operations, in accordance with the Rule II-2 of the STCW International Convention as amended
- Knowing how to control trim, stability and stress, in accordance with the Rules II-2 and III-2 of the STCW International Convention as amended
- Knowing how to develop emergency and damage control plans and handle emergency situations, in accordance with the Rule III-2 of the STCW International Convention as amended
- Knowing how to monitor the loading, stowage, securing, care during the voyage and the unloading of cargoes, in accordance with the Rule II-1 of the STCW International Convention as amended
- Knowing how to inspect and report defects and damage to cargo spaces, hatch covers and ballast tanks, in accordance with the Rule II-1 of the STCW International Convention as amended
- Knowing how to respond to navigational emergencies, in accordance with the Rule II-2 of the STCW International Convention as amended
- Knowing how to assess reported defects and damage to cargo spaces, hatch covers and ballast tanks and take appropriate action, in accordance with the Rule II-2 of the STCW International Convention as amended

#### 4. OBJECTIVES

Ship Theory at this level aims at knowledge, understanding and analysis of the theoretical models applied to the vessel as a scientific area, considering her as a float for the transport of goods and / or passengers by sea, initially studying the representation and interpretation of form and physical characteristics as a vessel, observing her degrees of freedom, stability for all load conditions and the result of the movement of weights on board. The different professional methods employed as well as the enforceable rules are analyzed. Furthermore, and specifically as established in the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers, the following objectives are established:

Know how to maintain seaworthiness from the point of view of the stability of the ship and her construction as required by the A-II / 1 table of the International STCW 2010 and particularly; on the stability of the ship:

Practical use of stability booklets, trim and stress tables, diagrams and stress calculating equipment; understanding of the fundamental aspects of watertightness and understanding of fundamental actions to be taken in case of partial loss of intact buoyancy, and the construction of the ship:

General knowledge of the principal structural elements of the ship and nomenclature of her various parts.

Know how to control trim, stability and the stresses of the ship's structure as required in the A-II / 2 table of the International Convention STCW 2010. And particularly, understanding of the fundamental principles of ship construction and the theories and factors affecting trim and stability of the ship, and necessary to maintain these measures and meet the recommendations of the International Maritime Organization on ship stability.

Knowing the application of Fluid Mechanics to the ship and the different means of propulsion.

Obtain the knowledge, understanding and proficiency listed in the correspondence tables II-1, II-2, III-1 and III-2 of the STCW International Convention, as amended, for the competences enumerated in section "3.1 Learning outcomes"

#### 6. COURSE ORGANIZATION

##### CONTENTS

1	Introduction to Ship Theory. Basic geometry of the hull: Plans and ships' lines. Lines drawing. Calculation of the elements of the hull and understanding of fundamental actions to be taken in cases of partial loss of intact buoyancy. Understanding of the fundamental aspects of watertightness. Hydrostatic principles. Approximate integration methods.
2	Calculation of cargo on board. Determination of displacement through hydrostatic curves: on an even keel, trimmed and Bonjean. Correction for deflection. Layer correction. Correction for density and correction for list.
3	Cross stability curves. Geometric and curvature centers. Locus of the center of Buoyancy, tipping point curve and R curve. Metacenter and metacentric radii. Variations in the parameters of the hull due to trim, specific gravity variation and cargo movements on board.
4	Intact stability. Initial stability with practical knowledge and use of tables and stability curves. Study of barges. Approximate formulas. Liquid in a tank. Corrections to the initial stability by the effect of free surfaces.
5	Stability for large angles of inclination. Heeling moments effect. Longitudinal stability with practical knowledge and use of trim tables. International Maritime Organization stability criteria.
6	Construction and structure of vessels with practical knowledge of the stresses of the ship, diagrams and stress calculating equipment.
7	Fluid Mechanics.
8	Naval technology. Type of vessels with knowledge of the main structural elements of the ship and the proper names of the various parts. Propulsion.

## 7. ASSESSMENT METHODS AND CRITERIA

Description	Type	Final Eval.	Reassessn	%
Part 1 and 2 exercises.	Written exam	No	Yes	25,00
Part 3, 4 and 5 exercises.	Written exam	No	Yes	25,00
Part 6 exercises.	Written exam	No	Yes	25,00
Lesson 7 and 8	Written exam	No	Yes	25,00
<b>TOTAL</b>				<b>100,00</b>
<b>Observations</b>				
This subject has two parts, namely: Ship Theory and Ship building. Average grade will be calculated between the two parts and the lowest note in a part must be greater or equal to 4 in order to pass the course.				
<b>Observations for part-time students</b>				
Students who are enrolled as part-time student will not be subject to any requirements regarding attendance at theory classes and classroom practices. The rest of the observations will be the same as for the rest of the students.				

## 8. BIBLIOGRAPHY AND TEACHING MATERIALS

### BASIC

- José Iván Martínez García, "Problemas de Teoría del Buque. Estática", editorial Cartamar, 2015. La Coruña.
- José Iván Martínez García, Motonave Medusa. <http://personales.gestion.unican.es/martinji/Archivos/MedusaA3.pdf>
- Olivella Puig, Joan, Teoría del Buque. Flotabilidad y estabilidad. Editado por la Universidad Politécnica de Cataluña. Barcelona 1994.
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- Antonio Bonilla de la Corte. Teoría del Buque. Librería San José. Vigo Cuarta edición 1994
- Carlos David Verdes Jove. Manual de Teoría del Buque. Cartamar 2013.
- Luis Delgado Lallemand, De proa a popa; Conceptos básicos, (tomo 1) EDITORIAL: Thomson Paraninfo S.A.
- Luis Delgado Lallemand, De proa a popa; Equipos en el Buque, (tomo 2) EDITORIAL: Thomson Paraninfo S.A.
- Antonio Bonilla de la Corte. Construcción Naval y servicios. Librería San José. Vigo 1984
- Francisco Fernández González. Construcción Naval I. Nomenclatura y Tecnología Navales (4 volúmenes). Apuntes editados por la Escuela Técnica Superior de Ingenieros Navales de Madrid. Universidad Politécnica de Madrid.