

## SUBJECT TEACHING GUIDE

### G1053 - Ship Theory and Naval Construction II

#### Degree in Nautical Engineering and Maritime Transport

Academic year 2023-2024

1. IDENTIFYING DATA					
Degree	Degree in Nautical Engineering and Maritime Transport			Type and Year	Compulsory. Year 3
Faculty	School of Maritime Engineering				
Discipline	Subject Area: Ship Theory and Naval Construction				
Course unit title and code	G1053 - Ship Theory and Naval Construction II				
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
Name of lecturer	DAVID SALVADOR SANZ SANCHEZ
E-mail	david.sanz@unican.es
Office	E.T.S. de Náutica. Planta: + 2. DESPACHO (210)
Other lecturers	

### 3.1 LEARNING OUTCOMES

- Knowledge of solving advanced problems in Ship Theory and Naval Construction in the conditions of intact and damaged ship.
- Knowledge of calculating displacement and drafts and all related corrections.
- Knowledge of the effect of upsetting moments on ship stability and related International Maritime Organization rules.
- Knowledge of the effect of free surfaces and suspended weights on ship stability.
- Knowledge of the effect on trim and stability of a ship in the event of damage to and consequent flooding of a compartment and countermeasures to be taken.
- Knowledge of the effect on trim and stability of grounded ship and countermeasures to be taken.
- Knowledge of International Maritime Organization recommendations concerning ship stability. Comprehensive knowledge of initial stability and stability at large angles of inclination.
- Understanding of principles of ship construction and the theories and factors affecting trim and stability and measures necessary to preserve trim and stability.

### 4. OBJECTIVES

Ship Theory at this level aims at knowledge, understanding, and analysis of the theoretical models applied to the ship as a scientific area, considering it as a float for the transport of goods and/or passengers by sea, studying its stability for any loading condition and for cases of significant loss of stability, the result of moving or shifting heavy weights on board and the effect of bilging compartments and accidents that may occur in shipping, and the effects of meteors. We also analyze the different professional methods employed as well as enforceable regulations.

Ship Theory at this level aims at knowledge, understanding, and analysis of the theoretical models applied to the ship as a scientific area, considering it as a float for the transport of goods and/or passengers by sea, studying its stability for any loading condition and for cases of significant loss of stability, the result of moving or shifting heavy weights on board and the effect of bilging compartments and accidents that may occur in shipping, and the effects of meteors. We also analyze the different professional methods employed as well as enforceable regulations.

Knowledge of the effect of cargo, including heavy lifts, on the seaworthiness and stability of the ship.

Knowledge of the effect on trim and stability of cargoes and cargo operations.

Use of stability and trim diagrams and stress-calculating equipment, including automatic data-based equipment, and knowledge of loading cargoes and ballasting in order to keep hull stress within acceptable limits.

Understanding of fundamental principles of ship construction and the theories and factors affecting trim and stability and measures necessary to preserve trim and stability.

Knowledge of the effect on the vessel's trim and stability of a ship in the event of grounding and countermeasures to be taken.

Knowledge of the effect of free surfaces in tanks and compartments.

Knowledge of International Maritime Organization recommendations concerning ship stability.

Knowledge of the effect on transverse stability of shifting grain in bulk and cargo in general.

## 6. COURSE ORGANIZATION

CONTENTS	
1	Displacement and drafts. Corrections. Hogging and sagging. Layer correction and Nemoto correction. Heel and specific gravity corrections. Extended draft survey. Use of Bonjean curves and advanced computational methods. Implementation with spreadsheet software.
2	Intact ship. Positive, neutral, and negative stability. Methods for determining vessel geometrical parameters. Scribanti's formula. Cross curves and tables. Initial stability. Stability at large angles of heel.
3	Heeling moments. International Maritime Organization rules. Heel due to wind, rudder, and people on board. Heel due to turning. Upsetting moments in tugs by tripping and pulling forces.
4	Weight and impaired stability. Study of free surfaces effect. Suspended weights and heavy-lift cargo operations and their effect on ship stability. Upsetting moments due to shifting of grain in bulk.
5	Damaged ship. Flooding and grounding. Control of hull stress and use of stress-calculating equipment.

## 7. ASSESSMENT METHODS AND CRITERIA

Description	Type	Final Eval.	Reassessn	%
Part 1, 2 and 3 Written exam	Written exam	No	Yes	40,00
Part 4 & 5 ·Written exam	Written exam	No	Yes	40,00
Team work	Work	No	No	20,00
TOTAL				100,00
Observations				
In the case of distance evaluation, the exams will be carried out through the Moodle platform.				
Observations for part-time students				
Part-time students may choose to be evaluated remotely regardless of the conditions of the rest of the students.				

## 8. BIBLIOGRAPHY AND TEACHING MATERIALS

BASIC
José Iván Martínez García, "Problemas de Teoría del Buque. Estática". Ediciones Cartamar, 2015. La Coruña.
Alaez Zazurca, J.A., "Teoría del Buque". Class notes edited by "Escuela Técnica Superior de Ingenieros Navales de Madrid". Universidad Politécnica de Madrid.
Klass Van Dokkum. Ship Stability. DOKMAR. Fourth edition. 2010
Byran Barrass & Derret, D. R., Ship stability for Master and Mates. Elsevier. London. 2006.
Olivella Puig, Joan, "Teoría del Buque. Flotabilidad y estabilidad". "Universidad Politécnica de Cataluña". Barcelona 1994
Olivella Puig, Joan, "Teoría del Buque. Estabilidad, varada e inundación". "Universidad Politécnica de Cataluña". Barcelona 1996.
Antonio Bonilla de la Corte. "Teoría del Buque". "Librería San José". Vigo.
Carlos David Verdes Jove, Manual de Teoría del Buque. Ediciones Cartamar. 2013
Wardle B.J., "Operational level stability for Deck and Engineer Officers". Brown, Son & Ferguson, Ltd. Glasgow. 2021
Wardle B.J., "Management level stability". Brown, Son & Ferguson, Ltd. Glasgow. 2021
Clark I. C. Stability, Trim and Strength for Mercant Ships and Fishing Vessels. The Nautical Institute. Second edition. 2008
Rhodes, Martin A. Ship Stability for Mates/Masters. Witherbys Seamanship International Ltd. First edition. 2003

