



## Course guide

# 280628 - 280628 - Transport of Dangerous, Hazardous and Harmful Goods

Last modified: 09/05/2023

**Unit in charge:** Barcelona School of Nautical Studies

**Teaching unit:** 742 - CEN - Department of Nautical Sciences and Engineering.

**Degree:** BACHELOR'S DEGREE IN NAUTICAL SCIENCE AND MARITIME TRANSPORT (Syllabus 2010). (Compulsory subject).

**Academic year:** 2023    **ECTS Credits:** 4.5    **Languages:** Spanish

## LECTURER

**Coordinating lecturer:** JOSE MANUEL VALLELLANO GARCÍA

**Others:** Primer quadrimestre:  
JOSE MANUEL VALLELLANO GARCÍA - GNTM

## PRIOR SKILLS

Having Passed the course 280618 "STOWAGE"

## DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

### Specific:

4. Knowledge of maintenance equipment load measurement and control systems of the atmospheres of cargo space and equipment of tankers for transportation of liquefied petroleum natural gas oil, transportation of crude oil derivatives and chemicals .
3. Knowledge of the organization and management capacity for repair projects, installation, modification and maintenance of loading equipment, storage and security systems and means of loading and auxiliary vessel.
5. Knowledge and ability to perform calculations stowage and securing of the goods. Meteorology of the wineries. Equipment for loading and unloading ships, operation and calculation. S special transport facilities afloat. Review, planning, calculation of loading, stowage and lashing. Dangerous goods. Protection of goods design and calculation. Measurement and control equipment.
2. Specific knowledge of naval construction processes. Structural description of vessels and parts thereof. Types of ships. Terms of ships from the construction point of view. Materials and protection. Resistance efforts and vibration. Knowledge of procedures for inspection and the Classification Societies.

### Transversal:

1. SUSTAINABILITY AND SOCIAL COMMITMENT - Level 3. Taking social, economic and environmental factors into account in the application of solutions. Undertaking projects that tie in with human development and sustainability.

## TEACHING METHODOLOGY



## LEARNING OBJECTIVES OF THE SUBJECT

The student should know how to operate the loading and discharging systems of the special cargoes ships.

### Competencies

The specifics CE.24, 25, 26 i 27

Additionally the ones of chart A-II/1 in the STCW convention: "Monitor de loading, stowage, securing, care during the voyage and the unloading of cargoes" partially and the chart A-II/2 of the STCW convention: "Carriage of dangerous goods" partially and of chart A-V/1 parts 1,2,3,4,5,6,7. Also of chart B-V/1 parts 13,14,15

## STUDY LOAD

Type	Hours	Percentage
Hours small group	6,0	5.33
Guided activities	9,0	8.00
Hours large group	15,0	13.33
Hours medium group	15,0	13.33
Self study	67,5	60.00

**Total learning time:** 112.5 h

## CONTENTS

### Chapter 1: Basic training for oil and chemical tanker cargo operations

#### Description:

Provide training to students to be duly qualified under sections A-V/1-1 and B-V/1 of the STCW Code with specific duties and responsibilities related to cargo or cargo equipment on oil or chemical tankers.

- Introduction (Development of tankers ,types,piping system,cargo pumps, Types of cargoes, Tanker terminology, Rules and regulations)
- Toxicity and Other Hazards
- Hazard control
- Safety Equipment and Protection of personnel
- Pollution Prevention
- Cargo equipment
- Cargo operations

#### Specific objectives:

- \* Familiarization with the equipment, instrumentation and controls used for cargo handling on a tanker
- \* Greater awareness of the need of proper planning, the use of checklists and the time scales involved in the various cargo handling Operations
- \* Enhanced awareness to apply proper and safe procedures at all times when carrying out the various Operations on board and oil or chemical tanker
- \* Acquisition of experience in identifying operational problems and assist in solving them
- \* Improvement in the ability to promote safety and protect the marine environment
- \* Increased ability to assist and coordinate actions during emergencies.

#### Related activities:

Resolution of a real maritime accident

#### Full-or-part-time:

22h

Theory classes: 9h 30m

Practical classes: 3h

Self study : 9h 30m



## Chapter 2: Advanced training for oil tanker cargo operations

### Description:

Provide training to students to meet the requirements of section A-V/1-1-2 and B-V/1.1 of the STCW Code with specific duties for loading, unloading and care in transit or hanling of oil cargoes.

- Knowledge of oil tanker design, systems and equipment
- Knowledge of pump theory and characteristics, including types of cargo pumps and their safe operation
- Proficiency in tanker safety culture and implementation of safety management system
- Knowledge and understanding of monitoring and safety systems, including the emergency shutdown
- Loading, unloading, care and handling of cargo
- Knowledge of the effect of bulk liquid cargoes on trim, stability and structural integrity
- Knowledge and understanding of oil cargo related operations
- Development and application of cargo-related operation plans, procedures and checklists
- Ability to calibrate and use monitoring and gas detection systems, instruments and equipment
- Ability to manage and supervise personnel with cargo-related responsibilities
- Knowledge and understanding of the hazards and control measures associated with oil tanker cargo operations
- Knowledge and understanding of safe working practices, includin risk assesment and personal shipboard safety relevant to oil tankers
- Knowledge and understanding of oil tanker emergency procedures
- Actions to be taken following collisin, grounding, or spillage
- Knowledge and understanding of relevant provisions of the International Convention for the Prevention of Pollution from Ships (MARPOL), as amended, and other relevant IMO instruments, industry guidelines and port regulations as commonly applied

### Specific objectives:

- \* Familiarization with the equipment, instrumentation and controls used for cargo handling on an oil tanker
- \* A greater awareness of the need of proper planning, the use of checklists and the time scales involved in the varios cargo handling Operations.
- \* An enhanced awareness to apply proper and safe procedures at all times when carrying out the varios Operations on board an oil tanker
- \* An acquisition of experience in identifying operational problems and assist in solving them
- \* An improvement in the ability to promote safety and protect the marine environment
- \* An increased ability to assist an dcoordinate actions during emergencies

### Related activities:

Maritime accident resolution

**Full-or-part-time:** 27h 15m

Theory classes: 12h 08m

Practical classes: 3h

Self study : 12h 07m



### Chapter 3: Advanced training for chemical tanker cargo operations

#### Description:

Provide training to students to be duly qualified, in accordance with section A-V/1-1-3 and B-V/1-1 of the STCW Code, with specific duties for loading, unloading and care in transit of chemical tanker cargoes

- Knowledge of chemical tanker designs, systems and equipments
- Knowledge of pump theory and characteristics, including types of cargo, pumps and their safe operations
- Proficiency in tanker safety culture and implementation of safety management system
- Knowledge and understanding of monitoring and safety systems, including the emergency shutdown system
- Ability to perform cargo measurement and calculations
- Knowledge of the effect of bulk liquid cargoes on trim and stability and structural integrity
- Knowledge and understanding of chemical cargo-related operations
- Development and application of cargo-related operation plans, procedures and checklists
- Ability to calibrate and use monitoring and gas-detection systems, instruments and equipment
- Ability to manage and supervise personnel with cargo-related responsibilities
- Knowledge and understanding of the chemical and the physical properties of noxious liquid substances
- Understanding the information contained in a Safety Data Sheet (SDS)
- Knowledge and understanding of the hazards and control measures associated with chemical tanker cargo operations
- Knowledge and understanding of dangers of non-compliance with relevant rules/regulations
- Knowledge and understanding of safe working practices, including risk assessment and personal shipboard safety relevant to chemical tankers
- Knowledge and understanding of chemical tanker emergency procedures
- Actions to be taken following collision, grounding or spillage
- Knowledge and understanding of relevant provisions of the International Convention for the Prevention of Pollution from Ships (MARPOL) and other relevant IMO instruments, industry guidelines and port regulations as commonly applied
- Proficiency in the use of the IBC Code and related documents

#### Specific objectives:

- \* Familiarization with the equipment, instrumentation and controls used for cargo handling on an oil tanker
- \* A greater awareness of the need of proper planning, the use of checklists and the time scales involved in the various cargo handling Operations.
- \* An enhanced awareness to apply proper and safe procedures at all times when carrying out the various Operations on board an oil tanker
- \* An acquisition of experience in identifying operational problems and assist in solving them
- \* An improvement in the ability to promote safety and protect the marine environment
- \* An increased ability to assist and coordinate actions during emergencies

#### Related activities:

Maritime accident resolution

#### Full-or-part-time: 31h

Theory classes: 14h

Practical classes: 3h

Self study : 14h



## Chapter 4: Basic training for liquefied gas tanker cargo operations

### Description:

Provide training to candidates to be duly qualified under section A-V/1-2 and B-V/1.2 of the STCW Code with specific duties and responsibilities related to cargo or cargo equipment on liquefied gas tankers.

- Liqued gas tankers
- Cargo operations
- Physical properties of liquefied gases
- Hazards associated with tanker operations
- Hazard controls
- Information on a Material Safety Data Sheet (MSDS)
- Safe working practices and procedures in accordance with legislation and industry guidelines and personal shipboard safety relevant to liquefied gas tankers
- Effects of pollution on human and marine life
- Shipboard procedures to prevent pollution
- Measue to be taken in the event of spillage

### Specific objectives:

- \* Familiarization with the equipment, instrumentation and controls used for cargo handling on a liquefied gas tanker
- \* A greater awareness of the need of proper planning, the use of checklists and the time scales involved in the varios cargo handling Operations.
- \* An enhanced awareness to apply proper and safe procedures at all times when carrying out the varios Operations on board liquefied gas tanker
- \* An acquisition of experience in identifying operational problems and assist in solving them
- \* An improvement in the ability to promote safety and protect the marine environment
- \* An increased ability to assist an dcoordinate actions during emergencies

### Related activities:

Maritime accident resolution

**Full-or-part-time:** 18h 30m

Theory classes: 7h 45m

Practical classes: 3h

Self study : 7h 45m

## Chapter 5: Advanced training for liquefied gas tanker cargo operations

### Description:

Provide training to candidates to be duly qualified under section A-V/1-2 and B-V/1.1of the STCW Code with specific duties and responsibilities related to cargo or cargo equipment on liquefied gas tankers.

- Knowledge of liquefied gas tanker design, systems, and equipment
- Knowledgeof pump theory and characteristics, including types of cargo pumps and their safe operation
- Knowledge of the effect of bulk liquid cargoes on trim and stability and structural integrity
- Proficiency to apply tanker safety culture and implementation of safety management requirements
- Proficiency to apply safe preparations, procedures and checklist for all cargo operations
- Proficiency to perform cargo measurementst and calcuation
- Proficiency to manage and supervise personnel with cargo-related responsibilities
- Knowledge and understanding of basic chemistry and physics and the relevant definitions related to the safe carriage of liquefied gases in bulk in ships
- Understanding the information contained in an Material Safety Data Sheet (MSDS)
- Knowledge and understanding of the hazards and control measures associated with liquefied gas tanker cargo operations
- Proficiency to calibrate and use monitoring and gas detection systems, instruments and equipment
- Knowledge and understanding of dangers of non-compliance with relevant rules/regulation
- Knowledge and understanding of safe working practices, including risk assessment and personal shipboard safety relevant to liquefied gas tankers
- Knowledge and understanding of liquefied gas tanker emergency procedures



- Actions to be taken following collision, grounding or spillage and envelopment of the ship in toxic or flammable vapour
- Knowledge and understanding of relevant provisions of the International Convention for the Prevention of Pollution from Ships (MARPOL) and other relevant IMO instruments, industry guidelines and port regulations as commonly applied
- Proficiency in the use of the IBC and IGC Codes and related documents
  
- Knowledge of liquefied gas tanker design, systems, and equipment
- Knowledge of pump theory and characteristics, including types of cargo pumps and their safe operation
- Knowledge of the effect of bulk liquid cargoes on trim and stability and structural integrity
- Proficiency to apply tanker safety culture and implementation of safety management requirements
- Proficiency to apply safe preparations, procedures and checklist for all cargo operations
- Proficiency to perform cargo measurement and calculation
- Proficiency to manage and supervise personnel with cargo-related responsibilities
- Knowledge and understanding of basic chemistry and physics and the relevant definitions related to the safe carriage of liquefied gases in bulk in ships
- Understanding the information contained in a Material Safety Data Sheet (MSDS)
- Knowledge and understanding of the hazards and control measures associated with liquefied gas tanker cargo operations
- Proficiency to calibrate and use monitoring and gas detection systems, instruments and equipment
- Knowledge and understanding of dangers of non-compliance with relevant rules/regulation
- Knowledge and understanding of safe working practices, including risk assessment and personal shipboard safety relevant to liquefied gas tankers
- Knowledge and understanding of liquefied gas tanker emergency procedures
- Actions to be taken following collision, grounding or spillage and envelopment of the ship in toxic or flammable vapour
- Knowledge and understanding of relevant provisions of the International Convention for the Prevention of Pollution from Ships (MARPOL) and other relevant IMO instruments, industry guidelines and port regulations as commonly applied
- Proficiency in the use of the IBC and IGC Codes and related documents

**Specific objectives:**

Course involves:

- 1- Knowledge of liquefied gas tanker design, systems, and equipment
- 2- Knowledge of pump theory and characteristics, including types of cargo pumps and their safe operation
- 3- Knowledge of the effect of bulk liquid cargoes on trim and stability and structural integrity
- 4- Proficiency in tanker safety culture and implementation of safety management requirements
- 5- Proficiency to apply safe preparations, procedures and checklists for all cargo Operations
- 6- Proficiency to perform cargo measurements and calculations
- 7- Proficiency to manage and supervise personnel with cargo-related responsibilities
- 8- Knowledge and understanding of basic chemistry and physics and the relevant definitions related to the safe carriage of liquefied gases in bulk in ships
- 9- Understanding the information contained in a Material Safety Data Sheet (MSDS)
- 10- Knowledge and understanding of the hazards and control measures associated with liquefied gas tanker cargo Operations
- 11- Proficiency to calibrate and use monitoring and gas detection systems, instruments and equipment
- 12- Knowledge and understanding of dangers of non-compliance with relevant rules/regulations
- 13- Knowledge and understanding of safe working practices, including risk assessment and personal shipboard safety relevant to liquefied gas tankers
- 14- Knowledge and understanding of liquefied gas tanker emergency procedures
- 15- Actions to be taken following collision, grounding or spillage and envelopment of the ship in toxic or flammable vapour
- 16- Knowledge of Medical First Aid Guide for Use in Accidents involving Dangerous Goods (MFAG)
- 17- Understanding of procedures to prevent pollution of the environment
- 18- Knowledge and understanding of relevant provisions of the International Convention for the Prevention of Pollution from Ships (MARPOL) and other relevant IMO instruments, industry guidelines and port regulations as commonly applied
- 19- Proficiency in the use of the IBC and IGC Codes and related documents

**Full-or-part-time:** 32h 45m

Theory classes: 14h 52m

Practical classes: 3h

Self study : 14h 53m



## ACTIVITIES

### Simulator teaching

**Description:**

Simulator teaching:

- Basic knowledge of ship arrangements of an oil tanker and chemical tanker
- Knowledge of the effect of bulk liquid cargoes on trim, stability and structural integrity
- Proficiency to apply safe preparations, procedures and checklists for all cargo operations

**Specific objectives:**

acquire knowledge of ship arrangements of an oil tanker and chemical tanker, knowledge of the effect of bulk liquid cargoes on trim, stability and structural integrity and proficiency to apply safe preparations, procedures and checklists for all cargo operations

**Material:**

Simulator

**Related competencies :**

CE27.GEN. Knowledge of the organization and management capacity for repair projects, installation, modification and maintenance of loading equipment, storage and security systems and means of loading and auxiliary vessel.

CE25.GEN. Knowledge and ability to perform calculations stowage and securing of the goods. Meteorology of the wineries. Equipment for loading and unloading ships, operation and calculation. Special transport facilities afloat. Review, planning, calculation of loading, stowage and lashing. Dangerous goods. Protection of goods design and calculation. Measurement and control equipment.

CE26.GEN. Knowledge of maintenance equipment load measurement and control systems of the atmospheres of cargo space and equipment of tankers for transportation of liquefied petroleum natural gas oil, transportation of crude oil derivatives and chemicals .

CE24.GEN. Specific knowledge of naval construction processes. Structural description of vessels and parts thereof. Types of ships. Terms of ships from the construction point of view. Materials and protection. Resistance efforts and vibration. Knowledge of procedures for inspection and the Classification Societies.

**Full-or-part-time:** 10h

Laboratory classes: 10h

## GRADING SYSTEM

## BIBLIOGRAPHY

**Basic:**

- Organització Internacional Marítima. SOLAS : edición refundida de 2020 : texto refundido del Convenio internacional para la seguridad de la vida humana en el mar, 1974, y su protocolo de 1988 : artículos, anexos y certificados. Londres: IMO, 2020. ISBN 9789280131253.
- Convenio Marpol : artículos, protocolos, anexos e interpretaciones unificadas del Convenio internacional para prevenir la contaminación por los buques, 1973, modificado por el Protocolo de 1978 y 1997. Ed. refundida. London: OMI, 2011. ISBN 9789280131031.
- Organització Internacional Marítima. Código IMDG : código marítimo internacional de mercancías peligrosas. Londres: IMO, 2021. ISBN 9789280131734.
- BCH CODE : Code for the construction and equipment of ships carrying dangerous chemicals in bulk. 9th ed. London: OMI, 2009. ISBN 9789280115093.
- Organización Marítima Internacional. Código internacional para la construcción y el equipo de buques que transporten productos químicos peligrosos a granel: código CIQ. Londres: OMI, 2007. ISBN 9789280101461.
- International safety guide for oil tankers and terminals (ISGOTT). 6th ed. London: Witherby, 2020. ISBN 9781856099189.

**Complementary:**



- Solly, Ray. The development of crude oil tankers : a historical miscellany [on line]. Yorkshire, Philadelphia: Pen & Sword Transport, an imprint of Pen & Sword Books Ltd, 2021 [Consultation: 05/12/2023]. Available on: <https://ebookcentral-proquest-com.recursos.biblioteca.upc.edu/lib/upcatalunya-ebooks/detail.action?pq-origsite=primo&docID=6996042>. ISBN 9781526792440.