



Grant Agreement No.: 2023-1-HR01-KA220-HED-000164970

Name of the lead partner organisation: University of Zadar

Project title: Micro-qualifications in seafarers' education and training

Project acronym: MICROMET

Programme: Erasmus+

Action Type: KA220-HED - Cooperation partnerships in higher education

Project duration in months: 30

Work package: Short learning programmes in the maritime industry

Activity title: A 3. Analysis of non-STCW short learning programmes' contents and outcomes for seafarers at LNG carriers, crude oil tankers and cruise ships.

Activity description: With this activity, we are planning to analyze non-STCW short learning programmes' contents and outcomes for seafarers at LNG carriers, tankers and cruise ships.

Partner responsible: University of Zadar

Dissemination level: CO - Confidential

Status: Draft

Date: 1st November 2024

WP2 Short learning programmes in the maritime industry

Report on mapping of competencies contained in STCW and non-STCW short courses.



Funded by
the European Union

Contents

Introduction.....	3
Competences in maritime industry.....	4
Competences covered in STCW short courses for seafarers at LNG carriers, cruise ships and tankers	6
Competencies covered in in STCW and non-STCW short courses for seafarers at LNG carriers....	6
Competencies covered in in STCW short courses for seafarers at LNG carriers	7
Competencies covered in STCW short courses for seafarers at cruise ships	14
Competencies covered in non-STCW short courses for seafarers at cruise ships	16
Competencies covered in in STCW short courses for seafarers at tankers	20
Competencies covered in non-STCW short courses for seafarers at tankers	21
Competencies covered in online courses.....	23
Competencies covered in online courses for seafarers at LNG carriers and tankers	24
Competencies covered in online courses for seafarers at cruise ships	26
Conclusion	27
References	28

Introduction

Short courses for seafarers, conducted at accredited educational institutions or privately owned training centers, play a crucial role in seafarer's education. Short courses for seafarers can be divided into courses prescribed by the STCW Convention and courses that are the result of the requirements of shipping companies. Since seafarers' education is partially standardized at the international level through the application of the STCW Convention, short courses prescribed in the STCW Convention usually have similar contents and learning outcomes, recommended by the IMO Model Courses. However, it is not uncommon for the topics and schedule of these courses to vary across different countries and educational institutions.

Another type of short courses for seafarers are the courses that are the result of the requirements of shipping companies, and are not prescribed by the STCW Convention. These short courses are the result of companies' needs and requirements. The number, contents, outcomes and duration of these courses, i.e. non-STCW short courses required for seafarers sailing on different types of vessels is unknown. Additionally, there is no database on the number of short courses needed for different types of vessels of different companies, and there is no comparison among short courses on different types of vessels.

Maritime industry has a great advantage having internationally recognized standards for seafarers' education. This may mean that cooperation between METI and shipping companies on improving educational and training programs for seafarers is at significant level. Unfortunately, this is not the case. The main problem regarding this topic is the lack of cooperation between METI in different countries, as well as the lack of cooperation between METI and training providers and shipping companies. Due to the lack of cooperation between maritime higher institutions and training centers, especially from different countries, there is no insight into the content and the number of courses that seafarers have to attend. This information remains between seafarers and their companies/training centers. Therefore, it is important to analyze additional courses for different types of vessels in order to get an overview of their course requirements. Since many of these courses are identified for certain technologies, some of them may become standardized and incorporated in the STCW Convention and the undergraduate study programs, which can positively affect the MET.

LNG carriers, cruise vessels and tankers are selected type of vessels in this research as these types of vessels are the leaders in the shipping industry when it comes to technology implementation, safety, and focus on environmental protection. It is expected that these trends will step up in the next period with more stringent regulations placed forward by administrations. These types of vessels were chosen because of their specialized equipment and a high rate of implementation of new systems needed for safe operations. Since there are no agreed

international standards, programmes differ in duration, content, and reasons as why shipping companies require them.

In order to compile data on courses, a seafarers' form was created, containing the following information on the seafarers: level of education (high school, undergraduate faculty level, graduate faculty level), nationality, rank and vessel type, STCW certificates, additional non-STCW certificates, and online courses required by their shipping company. The seafarers' form was distributed on the project and faculty websites, as well as on the faculty's social media platforms (LinkedIn and Instagram). It was also sent to some seafarers via email. Furthermore, masters, chief officers, and shipping companies were interviewed about the additional courses needed for their seafarers.

Competences in maritime industry

Technological development has a strong impact on maritime industry (Maritime 2050, 2019). New, functional organization on board a ship has changed the role of the crew. Due to evolving technologies, the role of the crew is becoming extremely complex (Pourzanjani, Ali 2008). Besides, an increased digitalisation and automation on board and in maritime industry in general, require more advanced technical knowledge and expertise than in the past times (The Maritime Executive, 2020). Therefore, a modification of competences needed for jobs on board is necessary (Cicek, et al., 2019). In other words, technological development requires changes in MET (Osavik, et al., 2020). As pointed out by Rayner, "... competence is not forever. Changes in policy, procedures, regulations, technology and equipment, business goals and objectives, all mean that workplace performance standards need to be modified and updated. And new standards must be developed for new job functions that may arise from the changes" (Rayner, 2020).

Competences are usually defined as the ability to do something successfully or efficiently (Mulder, 2014) or as a dynamic combination of knowledge, understanding and skills (Caena, 2011; STCW Convention, 2010). However, according to some authors, competences consist of not only knowledge, understanding and skills, but of attitudes as well (DeSeCo, O.E.C.D., 2005; Nanzhao, 2005; Wahba, 2013).

Traditional education places an emphasis on the process of acquiring knowledge, whereas, competence based education emphasises the process of acquiring competences (Gruppen, et al., 2016). Competence based educational programmes need to specify and explain in detail all the types of competences that should be acquired upon completion of a programme (Sánchez et al. 2008).

The literature offers various classifications of competences. Some authors differ core and functional competences (OECD, 2014); some differ functional, foundational and organizational

competences (Guide for Writing Functional Competencies, 2005); some differ generic and specific competences (Tuning Project, 2014; Biesma-Blanco, et al. 2007). A classification of competences stated at Global Maritime Professional, Body of Knowledge from 2019 is important for maritime professions. It differs the following competences: foundational knowledge and skills, academic skills, professional-technical skills and professional-soft skills (GPM Body of Knowledge, 2019).

In maritime industry, professional competences are prescribed in STCW Convention. Every institution involved in formal education of deck officers at management level, has to offer minimum standards prescribed by STCW Convention in their study programmes. Competence standards that have to be met by seafarers are defined in STCW Convention; however, it is not unusual that most countries have gone well beyond them.

Competences described in the STCW Convention refer mostly to ships that were commonly trading at the times the Convention's rules were adopted. At that time, the process of maintaining and upgrading the required competences was relatively simple, and was usually done by attending a few short courses or a specific on board training. In maritime industry, these programmes can be divided into the following categories: the ones prescribed by STCW Convention, and the ones required by shipping companies (Gundić et al., 2016). Nowadays however, in view of technological differences among various ship types and trades, competences are not easily transferrable, thus, attending short courses is not enough, especially for technologically advanced ships (e.g. LNG ships or cruise ships).

STCW Convention prescribes mostly professional competences. However, if we take into consideration that maritime industry has become extremely complex and global recently, we can conclude that professional competences are not enough for its proper functioning. Present-day crew should be able to work in a team, solve problems, analyse more information simultaneously, think critically, etc. (Osavik, et.al., 2020). It is expected that leadership, ethics, human relations skills, multicultural/diversity awareness, teamwork, etc. (GMP Body of knowledge, 2019) will have the key role in the process of globalisation and technological development on board a ship.

It is important to emphasize, that the seafarers' trainings focus is on acquisition of hands-on practical skills. During the academic education, the emphasis is placed on the development of analytical and critical thinking skills (Manuel, 2017). However, it is still unknown to what extent different types of competences are present in programmes of academic education and seafarers' training.

Competences covered in STCW short courses for seafarers at LNG carriers, cruise ships and tankers

Some of the STCW courses are the same for all three types of vessels and depend on the seafarers' ranks. Senior officers have generally obtained more STCW courses' certificates than junior officers.

It is important to emphasize that seafarers sailing on different types of vessels have obtained different STCW courses' certificates. Therefore, seafarers sailing on LNG vessels have obtained the following certificates: Basic Training for Liquefied Gas Tanker Cargo Operations, Advanced Training for Liquefied Gas Tanker Cargo Operations. Seafarers sailing on tankers have obtained the following certificates: Basic Oil Tanker Cargo Operation, Basic Chemical Tanker Cargo Operation, Advanced Oil Tanker Cargo Operation, Advanced Chemical Tanker Cargo Operation. Seafarers sailing on cruisers have obtained the following certificates: Crowd Management Training, Crisis Management & Human Behaviour i Passenger Safety, Cargo Safety & Hull Integrity.

Due to different operation on these types of vessels (primarily cargo operations), the same categories are not suitable, so it is suggested that courses for LNG and tankers to be divided into the following categories: Navigation & Radio Communication, Safety & Security, Cargo Operations, Soft Skills and Other. For cruisers, slightly different categories are proposed: Navigation & Radio Communication, Safety & Security, Soft Skills and Other. Additionally, if possible, it is suggested to conduct an analysis of courses per rank, for the master, Chief Officer, Second Officer and Third Officer.

Competencies covered in in STCW and non-STCW short courses for seafarers at LNG carriers

Up to year 2000, LNG carriers they were built only for well-developed gas exploitation projects. The carriers operated in accordance with the long-term lease contracts and servicing predetermined (un)loading terminals. In the late 1970s, only 52 LNG carriers existed [1]. Since then, a significant expansion of the fleet has been noticed. Conventional LNG carriers are carriers with the capacity of 180,000 m³ with spherical Moss-Rosenberg independent tanks and prismatic membrane containment tanks. The term "other LNG carrier" refers to Q-Flex and Q-Max carriers with the cargo capacity of over 200,000 m³ and SRV (Shuttle and Regas Vessels), and FSRU (Floating Storage and Regasification Unit) vessels being capable to transport and store LNG, including the regasification of the LNG. Q-Flex carriers have the cargo capacity between 210,000 to 217,000 m³ whereas Q-Max carriers can transport from 263,000 to 266,000 m³ of LNG.

In 2023, global trade in LNG showed slight growth, with prices remaining above historical averages. This situation affects the existing fleet of LNG vessels, the order books for new builds, and the level of technology incorporated into constructing new LNG ships (Shell LNG Outlook for 2024). The number of new orders has entered a phase of growth, reaching nearly 54% of the total LNG carrier fleet. An increasing number of Floating Storage and Regasification Units (FSRU) in Europe, especially in the Baltic and North Sea regions, clearly indicates a trend toward diversifying sources of LNG and natural gas imports into Europe (Riviera, 2024).

Because of numerous reasons (delayed response from regulators, inherent resistance to change in education and training institutions, etc.) these additional training programs may not be in line with recent technological development. Discrepancies can be most obviously noticed on sophisticated vessels such as LNG carriers where the quantity and sophistication of equipment and gear needed for safe and optimal exploitation is present more than on other vessels. In order to handle the equipment and the vessel itself, the crew has to be continuously educated and trained in both, mandatory programs regulated by the STCW Convention [7] as well as in additional programs.

Recent upsurge of the LNG exploitation and consequent growth of the LNG transport capacities by sea have triggered numerous new technologies to be developed and implemented in LNG shipbuilding as well as on board LNG carriers. In spite of this, education and training programs, particularly those for LNG carriers, haven't followed these changes. Only recently, two IMO Model Courses dealing with training for liquefied gas tanker cargo operations have been updated. These Model Courses strictly follow the STCW Convention programs and as such, if properly implemented, ensure the level of knowledge, understanding and skills required by the Convention. On the other hand, there are numerous indications that even these improved model courses will not cover all skills and knowledge required for the complex work on board LNG carriers.

Competencies covered in in STCW short courses for seafarers at LNG carriers

According to the STCW Convention [7], officers and ratings assigned specific duties and responsibilities related to cargo or cargo equipment, need to have the Certificate in basic training for liquefied gas tanker cargo operations (STCW V/1-2-1). Except this certificate, the master, chief engineer officers, chief mates, second engineer officers and any person with immediate responsibility for loading, discharging, care in transit, handling of cargo, tank cleaning or other cargo-related operations on LNG carriers, need to have the Certificate in advanced training for liquefied gas tanker cargo operations (STCW V/1-2-2). The main goal is to enable the responsible seafarers to obtain basic understanding and knowledge of the systems and operations needed for cargo handling, of the emergency procedures on LNG carriers, of chemical and physical characteristics of gases as well as of the characteristics of LNG carriers as well as legal requirements.

The accompanied IMO Model Course suggests 93 training hours for these programs of which 33 hours refer to the Basic Training for Liquefied Gas Tanker Cargo Operations, and 60 refer to the

Advanced Training for Liquefied Gas Tanker Cargo Operations. The analysis of their contents, required knowledge, understanding and skills reveals that to master such a complex matter in a given time is highly questionable.

By analyzing the forms completed by seafarers, the most commonly stated STCW courses by masters sailing on this type of vessel were identified. It is also worth noting that crew members on these vessels may possess additional STCW courses, which depends on their previous experience on various types of ships and their level of formal education.

Table 1. STCW short courses for seafarers at LNG carriers (example for master)

STCW	Name
II/2, IV/2	Certificate of Competency
A-VI/1-1	Personal Survival Techniques
A-VI/1-2	Fire Prevention & Fire Fighting
A-VI/1-3	Elementary First Aid
A-VI/1-4	Personal Safety and Social Responsibilities
A-VI/2-1	Proficiency in Survival Craft & Rescue Boats, other than fast rescue boats
A-VI/2-2	Proficiency in Fast Rescue Boats (only for vessels equipped with FRB)
A-VI/3	Advanced Fire Fighting
A-VI/4-1	Medical First Aid
V/1-2-1	Basic Training for Liquefied Gas Tankers
V/1-2-2	Advanced Training for Liquefied Gas Tankers
A-VI/4-2	Medical Care
A-VI/6-1	Security Awareness
A-VI/6	Designated Security Duties
A-VI/5	Ship Security Officers
A-II/2	Radar - ARPA
A-IV/2	GMDSS Operator
IMO 1.27	ECDIS (Generic)
STCW A II/1, A II/2, A III/1, A III/2)	Leadership and Management Training
A-II/1, B-VIII/2, Part 3-1	STCW Bridge Resource Management

Research conducted during the project identified a total of 87 non-STCW courses specifically designed for seafarers operating on LNG carriers. List of additional non-STCW short courses for seafarers at LNG carriers:

1. Advanced First Aid, Trauma Management, 2. Advanced Training for Ships Operating in Polar Waters (STCW A-V/4-2) - Sovcomflot & other locations, 3. Air Liquide- Sub cooling system TBF 700, 4. Anti Piracy (POEA), 5. Azipod vessel operation, Management Level (H885/938) ABB - Finland (Turku), 6. Azipod vessel operations – Operational Level H883 ABB - Finland (Turku), 7. Ballast Handling and Pump operation, 8. Basic Maneuvering practices w/simulator (BMP), 9. Basic Training for Ships Operating in Polar Waters (STCW A-V/4-1) - Makarov & other locations, 10. Behavior Based Safety (BBS), 11. Behavioral Tool Familiarization, 12. Bridge Resource Management, 13. BRM/BTM w/Simulator, 14. Chief Radio Officer Course - Japanese Flag, 15. Cold Climate Working Training (TRAINING FOR CREW MEMBERS OF SHIPS OPERATING IN POLAR WATERS) - Makarov & other locations (AMTC), 16. Company Bridge Resource Management, 17. Converteam courses (only for JUL/BEC), 18. Emerson Gas Chromatograph 370XA and Flow Meter CMFHC4M, 19. Free fall lifeboats (only for vessels equipped with FFL), 20. Gas Free Operation, 21. GMDSS (GOC) - Bahamas Flag, 22. GMDSS (GOC) - Bahamas Flag, 23. Hazard Experience Training, 24. IAS Operation & Maintenance combined, 25. Ice Navigation Course, 26. Incident Investigation (TMSA requirement), 27. Integrated Automation System - Special Application Course Yokagowa (VP), 28. Integrated Automation System - Terasaki- WE-500 Operators Course, 29. Integrated Automation System Gasentec, 30. Integrated Automation Systems - Operators Course – Honeywell, 31. Integrated Automation Systems - K-Chief 700 Operator Course, Remote / Onsite – Kongsberg, 31. Integrated Automation Systems - K-Chief 700 Step 1- LNG, Sys. Intro Course, Remote / Onsite – Kongsberg, 32. Integrated Automation Systems - Operators Course, 33. Integrated Automation System - Azbil 411.0.lbE - Operators Course, 34. ISM Familiarization, 35. KLAWE ERC Assembly and Hose Recovery, 36. KLAWE Training LNG STS Bunkering Operation-QC/DC and Connection-Disconnection, 37. Kongsberg K-load, 38. LNG Bunkering: Respond Level (SGMF) Training Course Computer Based Training-Videotel Per Sec 2- 15 and 2-18, 39. LNG Cargo Control Room Resource Management, 40. LNG Cargo Handling w /Simulator, 41. LNG Cargo Handling w /Simulator (LNGCH), 42. LNG Carrier Standard Course - SIGTTO competency standards training (Management), 43. LNG Carrier Standard Course - SIGTTO competency standards training (Operational), 44. LNG Carrier Standard Training Course (Familiarization), 45. Media Handling, 46. Mental Health Awareness, 47. Mooring Ropes Inspection, 48. MPA/TR56 training Management and operation level to ensure it includes SIMOPS assessment training, 49. Operation use of automatic radar plotting aids (ARPA), 50. Passage Planning (Incl. ECDIS Familiarization), 51. Personnel Crane Lifting (Wave Basket Inspection & Maintenance course) -

Reflex Marine, 52. Pilotage exemption for Large Vessel (PELV), 53. Portable Atmosphere Testing Equipment (Drager), 54. Propulsion - Dual Fuel - Diesel / Electric Propulsion or approved period of onboard familiarisation as extra officer obtained (1-3 months), 55. Propulsion - GE Basics EPS (MV-7000) Training – General Electric, 56. Radar observation and plotting, 57. Radar observation and plotting LNG Carrier Standard Training Course (Familiarization), 58. Reliq PRS (Partial Reliq System), 59. Reliq PRS (Partial Reliq System) DSME Designed System, 60. Reliquefaction Plant – Cryostar, 61. Risk Assessment, 62. Safety In Galley & Leadership for Chief Cooks, 63. Sea Survival Tehniques, 64. Seafarers (Officer) Seminar, 65. Ship Handling / Full Mission based Simulator based (KONGSBERG), 66. Ship handling Simulator – Azimuth Stern Drive Azipod (Arc 7 Yamal) – Sovcomflot, 67. Ship Handling Simulator (Manned Model Accepted), 68. Ship Handling w/Simulator, 69. Ship Maneuvering (Bahia Blanca & Escobar), 70. Ship Security Officer - Japanese Flag, 71. Ship Security Officer (ISPS Code), 72. Shipboard Safety Officer (SIRE VIQ), 73. Shiphandling Simulation (Including Manned Model, Ice, Emergency), 74. SIGTTO competency standards training (Management), 75. SIGTTO competency standards training (Operational), 76. SIRE Training (including onboard SIRE training), 77. Soft Skills Development Program, 78. STS & FSRU Operations, 79. STS Operations Training - Seagull CBT Onboard, 80. Train the Trainer for Mariners, 81. Training course of Japanese domestic maritime law - Japanese Flag, 82. Training course of Japanese domestic maritime law (Hazardouse Substances) - Japanese Flag, 83. Twin Screw Ship Handling Simulator Course, 84. Type Specific ECDIS - Kongsberg K-Bridge, 85. Welding Course, 86. WX75 OPS & WXDF Basic, 87. xDF Engines Operation.

It should be noted that not all crew members attend all the listed non-STCW chort courses, as this depends on their rank on the vessel. The courses mentioned here are for the highest ranks, i.e. for the captain and the chief officer on LNG carriers.

The list was compiled based on the forms filled out by seafarers, who indicated all the courses they have completed. This same list was provided to experts during the workshop organized in June 2024 at the University of Zadar, where it was analyzed in detail. Based on their analysis, the table presented below was created.

This list will be extended till the end of the project as we continue to conduct research via the Seafarers' Form, which is available on the project's website.

Table 2. Non-STCW short courses for seafarers at LNG carriers

Navigation & Radio Communication	Safety & Security	Cargo Operations	Soft Skills	Other
Azipod Vessel Operation, Management Level (H885/938)	Advanced First Aid, Trauma Management	Cargo Handling Simulator Course	Bridge Resource Management	Propulsion - Dual Fuel - Diesel / Electric Propulsion or approved period of onboard familiarisation as extra officer obtained (1-3 months)
Azipod Vessel Operations – Operational Level (H883)	Anti-Piracy (POEA)	LNG Cargo Handling w/ Simulator	Train the Trainer for Mariners	Propulsion - GE Basics EPS (MV-7000) Training – General Electric
Radar observation and plotting LNG Carrier Standard Training Course (Familiarization)	Cold Climate Working Training	Ballast Handling and Pump Operation	Soft Skills Development Program	Training course of Japanese domestic maritime law - Flag
Navigational Skills Assessment Program	Incident Investigation (TMSA Requirement)	MPA/TR56 training Management and operation level to ensure it includes SIMOPS assessment training	Media Handling	Welding Course,
GMDSS (GOC) - Flag	Shipboard Safety Officer (SIRE VIQ)	STS Operations Training	Leadership Self Awareness	WX75 OPS & WXDF Basic,
Advanced Training for Ships Operating in Polar Waters (STCW A-V/4-2) - Sovcomflot & other locations	Cyber Security	Integrated Automation Systems - K-Chief 700 Operator Course, Remote / Onsite – Kongsberg	Behavioral Tool Familiarization	xDF Engines Operation
Basic Maneuvering Practices w/Simulator (BMP)	Behavior Based Safety (BBS)	Air Liquide - Sub Cooling System TBF 700	BRM /BTM w/Simulator	



MICROMET

Micro-qualifications in seafarers' education and training

Chief Radio Officer Course - Flag	ISM Familiarization	Gas Free Operation	Company Bridge Resource Management	
Passage Planning (Incl. ECDIS Familiarization)	Free Fall Lifeboats	KLAW ERC Assembly and Hose Recovery		
Operation use of automatic radar plotting aids (ARPA	Safety in Galley & Leadership for Chief Cooks	KLAW Training LNG STS Bunkering Operation-QC/DC and Connection-Disconnection		
Radar observation and plotting	Hazard Experience Training	LNG Bunkering: Respond Level (SGMF) Training Course		
Mooring Ropes Inspection	Ship Security Officer - Flag	LNG Cargo Control Room Resource Management		
Twin Screw Ship Handling Simulator Course	Ship Security Officer (ISPS Code)	LNG Carrier Standard Course - SIGTTO competency standards training (Management)		
Ship Handling / Full Mission based Simulator based (KONGSBERG)	Risk Assessment	LNG Carrier Standard Course - SIGTTO competency standards training (Operational)		
Ship handling Simulator – Azimuth Stern Drive Azipod (Arc 7 Yamal) – Sovcomflot	Safety In Galley & Leadership for Chief Cooks	STS & FSRU Operations		
Ship Handling Simulator (Manned Model Accepted)	Sea Survival Tehniques	STS Operations Training - Seagull CBT Onboard		
Ship Handling w/Simulator	Seafarers (Officer) Seminar	Emerson Gas Chromatograph 370XA and Flow Meter CMFHC4M		
Ship Maneuvering (Bahia Blanca & Escobar)	Personnel Crane Lifting (Wave Basket Inspection & Maintenance course) - Reflex Marine	Converteam courses (only for JUL/BEC)		



Funded by
the European Union



MICROMET

Micro-qualifications in seafarers' education and training

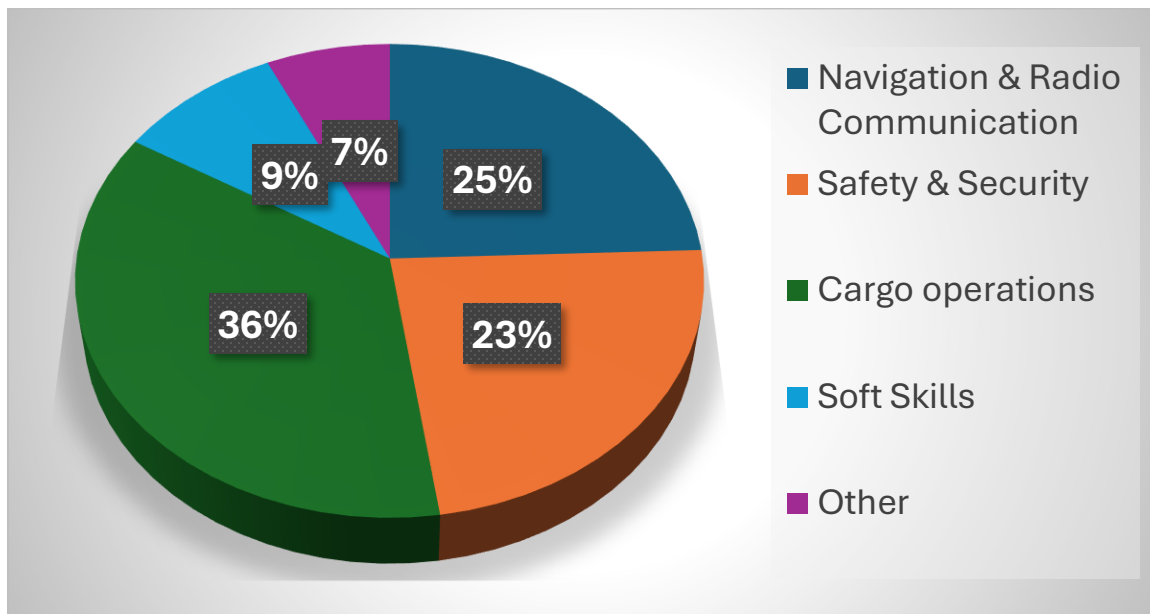
Ice Navigation Course	LNG Carrier Standard Training Course (Familiarization)	IAS Operation & Maintenance combined		
Pilotage exemption for Large Vessel (PELV)	SIRE Training (including onboard SIRE training)	Integrated Automation System - Special Application Course Yokagowa (VP)		
Type Specific ECDIS - Kongsberg K-Bridge		Integrated Automation System - Terasaki- WE-500 Operators Course,		
		Integrated Automation System Gasentec		
		Integrated Automation Systems - Operators Course – Honeywell		
		Reliq PRS (Partial Reliq System)		
		Reliq PRS (Partial Reliq System) DSME Designed System		
		Reliquefaction Plant – Cryostar		
		Portable Atmosphere Testing Equipment (Drager)		
		Integrated Automation Systems - K-Chief 700 Step 1- LNG, Sys. Intro Course, Remote / Onsite – Kongsberg		
		Integrated Automation Systems - Operators Course		
		Intergrated Automation Ssystem - Azbil 411.0.lbE - Operators Course,		
		Kongsberg K-load		



Funded by
the European Union

All identified non-STCW courses have been categorized, and the percentage of courses within each category is shown in Graph 1.

Graph 1. Non-STCW courses within defined categories



In total, the courses cover a wide range of competencies across the categories of Navigation & Radio Communication, Safety & Security, Cargo Operations, Soft Skills, and Other, resulting in a comprehensive training framework for LNG carriers. In percentages, the programs are divided as follows: Navigation & Radio Communication 25%, Safety and security 23%, Cargo operations 36%, Soft skills 9% and Other 7%. It can be noticed that the highest percentage refers to Cargo operations, probably because the formal education and STCW short courses are not enough to safely perform cargo operations on LNG carriers.

Competencies covered in STCW short courses for seafarers at cruise ships

The cruise industry has proven to be resilient and is expected to surpass pre-COVID passenger numbers. Unlike LNG vessels, which are limited by terminal acceptance criteria, draft specifications, and capital expenditures, cruise "mega vessels" are encountering resistance from ports, cities, and environmentally sensitive maritime areas that ban these large ships due to concerns about "over-tourism" (Goodwin Recruiting, 2023). Additionally, the Cruise Lines International Association (CLIA) has made significant efforts to advance sustainability initiatives in

the cruise industry, emphasizing responsible tourism. Key points include offering cruise options based on environmental impact, striving for decarbonization with improvements in technology and infrastructure, using LNG as a transitional fuel while exploring sustainable and renewable marine fuels, and ensuring that newly constructed vessels are equipped with “cold ironing” capabilities (CLIA, 2023).

According to the STCW Convention, every master and chief mate have to complete approved education and training and meet the standard of competence specified in section A-II/2 and section A-V/2 of the STCW Convention.

Additionally, competences prescribed by the STCW Convention for cruise ships refer to Training in Crowd Management, Safety Training, Training in Passenger Safety, Cargo Safety and Hull Integrity and Training in Crisis Management and Human

Behaviour. These programmes are part of section A-V/2 of the STCW Convention. The IMO has developed the following Model Courses for this purpose:

- 1) IMO Model Course 1.28 - Crowd Management, Passenger Safety & Training for Personnel 1.28 and

- 2) IMO Model Course 1.29 - Proficiency in Crisis Management and Human Behaviour Training.

IMO Model Course 1.28 comprises 158 topics divided into the following categories: Crowd Management training; Familiarization training, Safety training for personnel providing direct Service to Passengers in Passenger Spaces. IMO Model Course 1.29 comprises 286 topics divided into the following categories: Passenger Safety, Cargo Safety and Hull Integrity Training; Crisis Management and Human Behaviour Training.

By analyzing the forms completed by seafarers, the most commonly stated STCW courses by masters sailing on this type of vessel were identified. It is also worth noting that crew members on these vessels may possess additional STCW courses, which depends on their previous experience on various types of ships and their level of formal education.

Table 3. STCW short courses for seafarers at cruise ships (example for master)

STCW	Name
II/2, IV/2	Certificate of Competency
A-VI/1	Basic (Safety) Training
A-VI/2-1	Proficiency in Survival Craft & Rescue Boats
A-VI/3	Advanced Fire Fighting
A-VI/4-1	Medical First Aid
IMO 1.27	Generic ECDIS
A-VI/6-2	Security Training - Designated Security Duties
A-V/2.1	Crowd Management Training
A-V/2-2	Safety Trng for Persons Prov. Direct Service to Paxs
A-V/2-3	Crisis Management & Human Behavior
A-V/2-4	Passenger Safety, Cargo Safety & Hull Integrity
A-V/4-1	Basic Training for Ships Operating in Polar Waters
A-II/1,III/1,III/6	Human Element Leadership & Management (Ops Lvl)

Competencies covered in non-STCW short courses for seafarers at cruise ships

Formal education programmes do not comprise all the competences needed for jobs on board because of the rapid growth of technologies and modifications of the functional organisation of a ship. That is the reason why additional education programmes have been developing. They ensure acquiring special knowledge for jobs on board. The example of cruise ships has shown that there is a significant number of additional education programmes developed as the answer to the requirements of companies or/and the industry. The number of additional education programmes needed for navigation of cruise ships shows that not all the necessary competences are being developed through programmes defined by the STCW Convention.

Research conducted during the project identified a total of 53 non-STCW courses specifically designed for seafarers at cruise ships. List of additional non-STCW short courses for seafarers at cruise ships:

1. Tender Coxswain Training,
2. Train The Trainer (TTT),
3. Environmental Awareness,
4. Environmental Record Keeping,
5. Ships Leisure Familiarisation,
6. Drugs and Alcohol,
7. PEC Pilot Exemption Certificate Greenland Svalbard (Norway NMA),
8. Senior Officer Leadership Programme - Module 1,
9. US Public Health,
10. Effective and Timely Coaching,
11. Authentic Leadership,
12. Anti-Bribery Policy Training,
13. Power of Communication,
14. Enhancing Leadership Presence,
15. Assist guests w/disabilities,
16. Keys to Emotional Intelligence,
17. Leadership Self Awareness,
18. Ship Handling,
19. Crowd MGMT Training,
20. Crisis MGT Human

Behavior, 21. CS Series Hazardous Substances, 22. Development Conversations, 23. Difficult Conversations, 24. Everyday Conversations, 25. Type Specific NACOS Platinum, 26. Integrated PEST Management TRN, 27. Marine Meteorology, 28. Navigation Policy and Procedures, 29. Public Health Awareness, 30. Root Cause and Correct Action, 31. Save the Waves, 32. Depression Aware Suicide Prevention, 33. Win on Waste, 34. Zero Tolerance MGT 2010, 35. Sailsafe Workplace Safety, 36. Shipboard Safety, 37. Pre-Departure Safety TRN 2010, 38. Fatigue 2010, 39. Cultural Diversity 2010, 40. Sperry Operators Voyage MGMT, 41. Time and Attendance, 42. Train the Trainers – Instructors, 43. Onboard Security Orientation, 44. OPP Awareness Training, 45. Guest Safety Briefing, 46. Unconscious Bias, 47. Ergonomics Ergonomics Awareness Training, 48. Data Privacy Awareness TRG, 49. Pipeline Work, 50. Rescue Procedures, 51. Leading Others Through Change, 52. Certified Lifeboatman, 53. Advanced COLREGS

It should be noted that not all crew members attend all the listed non-STCW chort courses, as this depends on their rank on the vessel. The courses mentioned here are for the highest ranks, i.e. for the captain and the chief officer on cruise ships.

This list will be extended till the end of the project as we continue to conduct research via the Seafarers' Form, which is available on the project's website.

The list was compiled based on the forms filled out by seafarers, who indicated all the courses they have completed. This same list was provided to experts during the workshop organized in June 2024 at the University of Zadar, where it was analyzed in detail. Based on their analysis, the table presented below was created.

Table 4. Non-STCW short courses for seafarers at cruise ships (example for master)

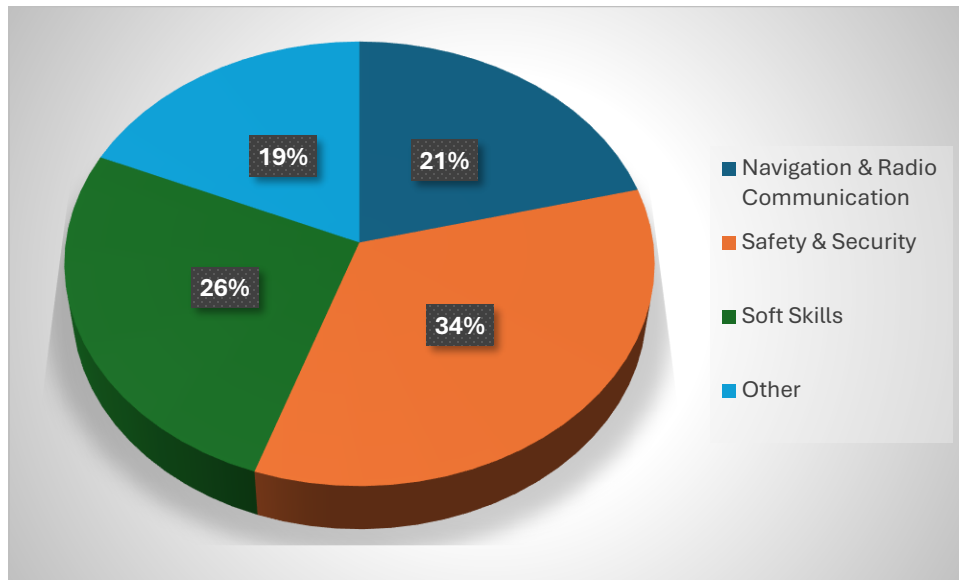
Navigation & Radio Communication	Safety & Security	Soft Skills	Other
Navigation Policy and Procedures	ISM/ISPS	Train The Trainer (TTT)	Company Management Software System
ECDIS Maker's Specific	Risk Assessment and Incident Investigation	Mental Health and Wellbeing	P&I Club Matters
Ship Handling	Permit to Work/Safety	Power of Communication	ISO Standards (45001, 9001, 14001)
ARPA	Shipboard Safety Officer	Leadership Self Awareness	Medical Laboratory Test for Chemical Carriers
Navigational Skills Assessment Program	MARPOL/Maintenance	Effective and Timely Coaching	Zero Tolerance Management
Paperless Navigation Familiarisation Tool	Environmental Record Keeping	Authentic Leadership	Data Privacy Awareness Training
Safe Passage in Singapore Strait Familiarisation Tool	Crisis Management Human Behavior	Keys to Emotional Intelligence	Pipeline Work
Tender Coxswain Training	Drug and Alcohol Awareness	Development Conversations	
	Prevention of Harassment and Bullying	Difficult Conversations	
	Behavioural Based Safety	Everyday Conversations	
	Cyber Security		
	Marine Risk Assessment		
	Incident Investigation & Root Cause Analysis		



MICROMET

Micro-qualifications in seafarers' education and training

Graph 2. Non-STCW courses within defined categories



In total, there are 53 courses categorized under Navigation & Radio Communication, Safety & Security, Soft Skills, and Other. In percentages, the programs are divided as follows: Navigation & Radio Communication 21%, Safety and security 34%, Soft skills 26 and Other 19%.

Courses listed for cruise ships cover a broad spectrum of crucial competencies, addressing safety, operational skills, and interpersonal communication. These short courses are designed to equip seafarers with the necessary knowledge and skills to perform their duties efficiently and safely while adapting to the evolving demands of the cruise industry.



Funded by
the European Union

Competencies covered in in STCW short courses for seafarers at tankers

With respect to tankers, a notable increase in new vessel orders for 2024 is attributed to the rise in contracts for Very Large Crude Carriers (VLCCs) (BIMCO). Freight rates have remained elevated since the onset of the war in Ukraine. The tightening of environmental regulations has highlighted the issue of aging fleets in the tanker industry. To address safety challenges and to protect the marine environment, many oil companies have set age limits on their vessels, which typically range from 15 to 20 years (DNV, 2024).

According to the STCW Convention, every master and chief mate have to complete approved education and training and meet the standard of competence specified in section A-II/2 and section A-V/2 of the STCW Convention.

Seafarers sailing on tankers have obtained the following certificates: Basic Oil Tanker Cargo Operation, Basic Chemical Tanker Cargo Operation, Advanced Oil Tanker Cargo Operation, Advanced Chemical Tanker Cargo Operation.

By analyzing the forms completed by seafarers, the most commonly stated STCW courses by masters sailing on this type of vessel were identified. It is also worth noting that crew members on these vessels may possess additional STCW courses, which depends on their previous experience on various types of ships and their level of formal education.

Table 5. STCW short courses for seafarers at crude oil and chemical tankers (example for master)

STCW	Name
II/2, IV/2	Certificate of competency
A-VI/1-1	Personal Survival Techniques
A-VI/1-2	Fire Prevention & Fire Fighting
A-VI/1-3	Elementary First Aid
A-VI/1-4	Personal Safety and Social Responsibilities
A-VI/2-1	Proficiency in Survival Craft & Rescue Boats, other than fast rescue boats
A-VI/2-2	Proficiency in Survival Craft & Rescue Boats (only for vessels equipped with FRB)
A-VI/3	Advanced Fire Fighting
A-VI/4-1	Medical First Aid
A-VI/4-2	Medical Care
A-VI/5	Ship Security Officer
A-V/1-1-1	Basic Chemical Tanker Cargo Operation
A-V/1-1-2	Advanced Oil Tanker Cargo Operation
A-V/1-1-3	Advanced Chemical Tanker Cargo Operation
A-II/2	ARPA Radar
B-V/A	Ship Handling & Manoeuvring (Large Vessels)
IMO 1.27	Generic ECDIS

A-V/4-1	Basic Training for Ships Operating in Polar Waters
A-II/1, A-II/2	Ship Handling & Manoeuvring Simulator

Competencies covered in non-STCW short courses for seafarers at tankers

Research conducted during the project identified a total of 48 non-STCW courses specifically designed for seafarers at tankers. List of additional non-STCW short courses for seafarers at tankers:

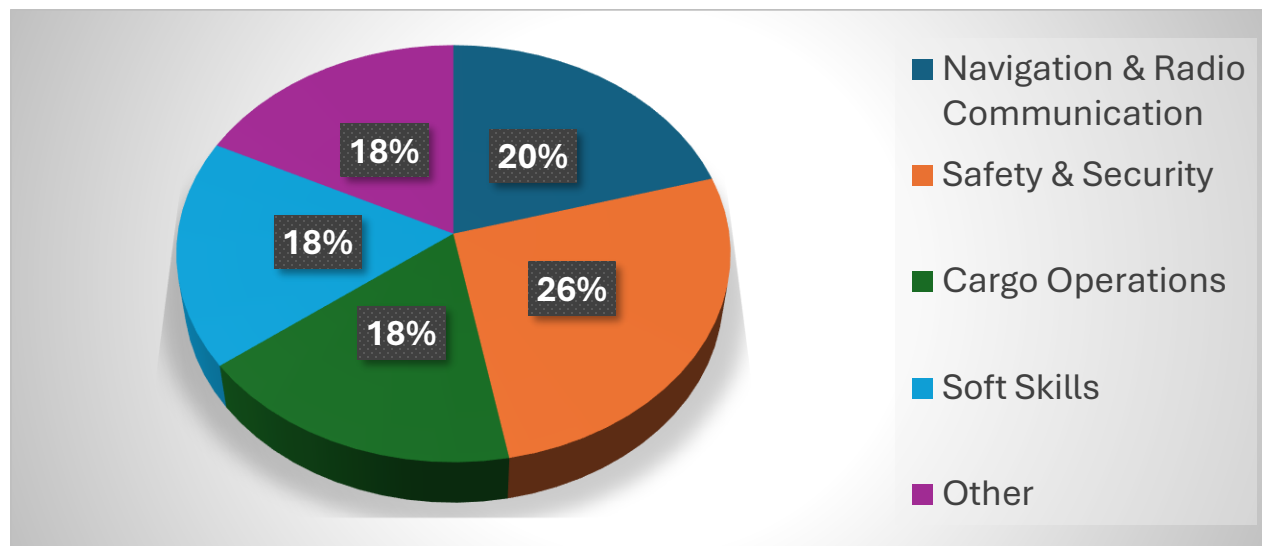
1. Risk assessment and incident investigation, 2. ISM/ISPS, 3 Permit to work /safety, 4. Shipboard safety officer, 5. Ship maneuvering and handling simulator course, 6. Cargo Handling Simulator Course, 7. Bridge team management, 8. Bridge resource management, 9. MARPOL / Maintenance, 10. PSC / Vetting Internal, 11. P&I club matters, 12. Ice simulator course, 13. STCW – MLC 2006, 14. Company Management Software System, 15. Specific ECDIS, 16. Management of change, 17. Cyber security, 18. Vessel Condition inspection, 19. Medical laboratory test for chem. Carrier, 20. ISO 45001, 20. ISO 9001, 21. Incident Investigation & Root cause analysis, 22. Risk assessment, 23. Shipboard Safety Officer, 24. Port State Control, 25. Vetting, 26. ISO 14001, 27. Oil Record Book, 28. VOC Management, 29. Energy Efficiency, 30. Bridge Team Management, 31. Bridge Resource Management, 32. ECDIS Maker's Specific, 33. ARPA, 34. Ship Handling Bridge Simulator, 35. Navigational Skills Assessment Program, 36. Paperless Navigation Familiarisation Tool, 37. Safe Passage in Singapore Strait Familiarisation Tool, 38. Cargo and Balast Handling on Oil Tankers, 39. Cargo and Balast Handling on Oil Tankers with Assessment Program, 40. STS Simulator, 41. Crude Oil Washing, 42. Inert system, 43. Swedish Club Academy MRM training, 44. Behavioural Based Safety, 45. e-NOA/D, 46. Train the Trainer, 47. VGP, 48. Crane operator

The list was compiled based on the forms filled out by seafarers, who indicated all the courses they have completed. It is not unusual for seafarers to sail on multiple types of vessels throughout their careers, and then they have taken courses related to other types of ships besides the one they are currently serving on. Therefore, during the workshop organized in June 2024 at the University of Zadar, we provided this list to experts who analyzed the identified courses. Based on their analysis, the table presented below was created.

Table 6. Non-STCW short courses for seafarers at crude oil and chemical tankers (example for master)

Navigation & Radio Communication	Safety & Security	Cargo Operations	Soft Skills	Other
Ship Maneuvering and Handling Simulator Course	Risk Assessment and Incident Investigation	Cargo and Ballast Handling on Oil Tankers	Bridge Team Management	P&I Club Matters
Cargo Handling Simulator Course	ISM/ISPS	Crude Oil Washing	Bridge Resource Management	ISO Standards (45001, 9001, 14001)
Specific ECDIS	Permit to Work/Safety	Inert System	Mental Health and Wellbeing	FSRU Operations
ARPA	Shipboard Safety Officer	STS Simulator	Company Management Software System	Medical Laboratory Test for Chemical Carriers
Navigational Skills Assessment Program	MARPOL/Maintenance	Oil Record Book	Management of Change	e-NOA/D
Paperless Navigation Familiarisation Tool	Incident Investigation & Root Cause Analysis	VOC Management	Train the Trainer	Energy Efficiency
Safe Passage in Singapore Strait Familiarisation Tool	Behavioural Based Safety			
	IMO Model Course 6.09 (related to safety training)			
	Cyber Security			

Graph 2. Non-STCW courses within defined categories



In total, there are 48 courses categorized under Navigation & Radio Communication, Safety & Security, Cargo Operations, Soft Skills, and Other. In percentages, the programs are divided as follows: Navigation & Radio Communication 20%, Safety and security 26%, Cargo Operations 18%, Soft skills 18 and Other 19%.

By focusing on specific themes related to navigation, safety, cargo operations, soft skills, and other relevant areas, these training programs contribute to the ongoing professional development of seafarers, enabling them to adapt to the evolving demands of the maritime industry.

Competencies covered in online courses

In addition to face-to-face courses, seafarers often attend online courses as well. These courses are different and cover a wide range of topics generally referring to safety on board, seafarers' mental health, work in specific ship environments, specific operations on certain types of vessels, environmental protection measures, and more. Online courses attended by the seafarers who participated in this research can be divided into the following categories: Navigation & Radio Communication, Operations, Safety & Security, Cargo Handling & Stowage, Soft Skills. These are, as a rule, CBT courses provided by companies like Videotel, Seagull, iLearn, and MINTRA e-Learning. Companies categorize online courses into mandatory courses that seafarers of a certain rank are required to take and pass, and those that are recommended for a particular rank.

Usually, these courses are part of Computer-Based Training (CBT), and some courses have the approval of classification societies. Generally, each crew member must complete a series of modules, with the number varying depending on their onboard position. They are required to register each completed module to obtain their certificate. Additionally, for some courses, refresher training is recommended, typically every three to five years.

By analyzing the forms completed by seafarers, the most commonly stated online courses for seafarers at LNG carriers, tankers and cruise ships were identified.

Competencies covered in online courses for seafarers at LNG carriers and tankers

Research conducted during the project identified a total of 75 online courses for seafarers at tankers and LNG carriers. List of online courses for seafarers at tankers and LNG carriers:

1. Basic Ship Handling,
2. Advanced Gas Tanker Regulations,
3. Awareness of Lifeboat Release and Retrieval Systems,
4. Ballast water management, the BWM Convention,
5. Basic Gas Tanker, Hazards and their Management,
6. Basic hydraulics,
7. Basic Refrigeration Theory,
8. COLREGs - Conduct of vessels; COLREGs - Lights, shapes and sound signals,
9. Communication for maritime leaders,
10. Conflict Management,
11. Corrective Feedback,
12. Culture Management,
13. Cyber Security - Common Threats & Traps; Cyber Security - Counter Measures; Cyber Security - Good Practices; Cyber Security - Your Role,
14. Decision Making Techniques,
15. Diversity and Inclusion at Sea,
16. ECDIS, Pilotage and berthing,
17. Electrical Safety,
18. Emergency Towing System,
19. Enclosed Space Entry, Emergencies & Rescue; Enclosed Space Entry, Hazard Awareness & Preparation for entry; Enclosed Space Entry, The entry operation,
20. Environmental, Social and Governance (ESG),
21. Ex equipment,
22. Fire in Accommodation - Electronic Devices Overheating,
23. Firefighting – Basic,
24. Fuel oil bunkering, Effective practice and sampling,
25. Galley Operation – Hygiene; Galley Operations, Food Handling; Galley Operations, Workplace and equipment safety,
26. Garbage and waste management,
27. Gas measurement, A safe atmosphere; Gas measurement, Measuring instruments,
28. GMDSS,
29. Human Relations, Social Responsibilities,
30. Incident investigation, Cause and effect,
31. Incident investigation, Investigation techniques,
32. Inert Gas Generator,
33. INS - Integrated Navigation System,
33. Introduction to MARPOL,
34. Introduction to two-stroke diesel engines,
35. Leadership, Effective Resource Management Part 2,
36. Lifting Operation - Safe Use of conventional cranes,
37. Liquid Cargo Properties,
38. LNG STS Familiarization Training,
39. LNG Sub cooler System (Turbo Brayton Fridge),
40. Lockout Tagout,
41. Marine environmental awareness - Protecting the environment,
42. Marine environmental awareness - The diverse environment,
43. Mentoring at sea,
44. MLC 2006, Onboard responsibilities,
45. MTI Seafarer Media Course,
46. Navigation in cold environments,
- 47.

Nutrition and Wellbeing – Awareness, 48. Oil record book part 1, 49. Onboard Energy Saving and the Environment **, 50. OPA 90, 51. Passage planning in cold environment, 52. Passage planning with ECDIS, 53. Personal Safety, 54. Personal Survival – Familiarisation, 55. Personal Survival - Rescue and Abandoning Ship, 56. Personal Survival - Survival Craft, 57. Personnel Basket Travel, 58. Pilot Ladders, 59. Port state control inspections, 60. Pumps and Pumping Operations, 61. Radar observation & plotting, 62. Risk Assessment and Management, 63. Safety Officer, 64. Seafarers' Mental Health and Wellbeing, 65. Selective Catalytic Reduction, 66. Sexual Harassment Prevention, 67. Ship Energy Efficiency, 68. Ship Energy Efficiency Management Plan (SEEMP), 69. SOPEP- Your role, 70. Stability II - Damage Stability, 71. Stress Management, 72. Task & Workload Management, 73. Team Leadership, 74. The ISM Code, 75. Vessel General Permit

The training courses offered on LNG ships and tankers cover a wide range of critical topics to ensure the safety, efficiency, and environmental compliance of maritime operations. Among the most prominent themes are Basic Ship Handling and Advanced Gas Tanker Regulations, which provide foundational and in-depth knowledge necessary for operating these specialized vessels. Additionally, courses on Awareness of Lifeboat Release and Retrieval Systems emphasize the importance of life-saving equipment and emergency preparedness.

Ballast Water Management and the BWM Convention are addressed to ensure compliance with environmental regulations aimed at protecting marine ecosystems. Participants also learn about Basic Gas Tanker Hazards and their Management, focusing on risk assessment and safety protocols specific to gas tankers. Basic Hydraulics and Basic Refrigeration Theory are included to help crew understand essential systems on board.

Moreover, training in COLREGs ensures that crew members are well-versed in the conduct of vessels and the applicable lights, shapes, and sound signals necessary for navigation. Communication for Maritime Leaders and Conflict Management courses highlight the importance of effective leadership and interpersonal skills in maritime environments. Furthermore, Cyber Security training encompasses common threats, countermeasures, and good practices, as the maritime industry increasingly faces digital challenges.

Lastly, courses addressing Environmental, Social and Governance (ESG) aspects signal the industry's commitment to sustainability, while Incident Investigation training equips seafarers with techniques to analyze and prevent future incidents, ultimately enhancing the overall safety culture onboard.

Competencies covered in online courses for seafarers at cruise ships

Research conducted during the project identified a total of 19 online courses for seafarers at cruise ships. List of online courses for seafarers at cruise ships:

1. Online Crowd Management, 2. E-Learning: Infection Prevention and Control Awareness: Infectious Disease Outbreak, 3. E-Learning: Infection Prevention and Control Awareness: Preventive Measures, 4. E-Learning: Vessel General Permit (VGP), 5. E-Learning: Enclosed Spaces, 6. E-Learning: AntiCorruption for Seafarers, 7. E-Learning: IT Safety at Sea, 8. E-Learning: Safety Culture video: Calling the Master, 9. E-Learning: Navigational Safety Video, 10. E-Learning: International Collision Regulation, 11. E-Learning: Culture Management, 12. E-Learning: Harassment and Bullying, 13. E-Learning: SOPEP / SMPEP response (OPA 90), 14. E-Learning: Lifeboat release and retrieval systems, 15. E-Learning: Seafarer Performance Appraisal, 16. E-Learning: Toolbox Talks, 17. E-Learning: MTI Seafarer Media Course, 18. E-Learning: Safe Mooring, 19. SOLP eLearning / Module 1.

The online courses available for cruise ship crew members encompass a diverse range of essential topics aimed at enhancing safety, compliance, and overall operational efficiency. One of the primary focuses is Online Crowd Management, which teaches crew members how to effectively manage passenger safety in various situations. Infection Prevention and Control Awareness is another critical area covered through modules addressing infectious disease outbreaks and preventive measures, ensuring that crew members are well-prepared to maintain health standards. The E-Learning courses also include topics such as the Vessel General Permit (VGP), which ensures compliance with environmental regulations critical to maritime operations. Additionally, training on Enclosed Spaces prepares seafarers for safe entry and work in confined areas, reducing the risks associated with such environments. Anti-Corruption training aims to promote ethical practices within the maritime industry, while IT Safety at Sea emphasizes the secure use of technology on board.

Another significant theme is the promotion of a strong safety culture, exemplified by courses like the Safety Culture video: Calling the Master, which encourages effective communication within the hierarchy of the ship. Navigational Safety and International Collision Regulations are covered to enhance awareness and adherence to vital maritime laws. Furthermore, Culture Management and training on Harassment and Bullying foster a respectful and inclusive onboard environment.

Lastly, practical skills are sharpened through courses focusing on Lifeboat Release and Retrieval Systems, Safe Mooring practices, and Toolbox Talks, which provide essential safety briefings and updates on procedures. Collectively, these courses equip cruise ship crew members with the necessary knowledge and skills to navigate the complexities of their roles safely and effectively.

Conclusion

Due to rapid development of technology, it is almost impossible to expect the IMO Model Courses and study programmes to comprise all the professional competences needed on board. Shipping companies have recognized the problem, and are trying to minimize the discrepancy between required and actually needed knowledge through additional training programs. Potential measures to improve the current situation are:

- Significant extension of the presently required programs to include missing subjects, as it may be appropriate.
- New additional and mandatory training programs should be developed to cover the subjects that are highly required by the shipping companies but cannot be easily included in the existing programs. The program(s) should be developed as a further extension of knowledge and proficiency beyond requirements outlined in the present Advanced training programs.

Short courses aim at acquiring professional competences, i.e. competences needed for specialised jobs on LNG carriers, tankers and cruise ships. It is reasonable to assume that a part of the competences needed for highly specialised jobs on some type of ships will continue to be acquired through short courses in the future. The topics that aim at acquiring generic competences refer mostly to the following generic competences: team work, team management, decision-making and effective communication.

Based on the presented research results, it can be concluded that there is a need for standardization of additional non-STCW courses for seafarers on LNG vessels, cruise ships, and tankers.

Recognition and validation of seafarers' competencies acquired through additional non-STCW short courses will contribute to the standardization of seafarers' education and training process and cooperation among maritime higher institutions from different countries, as well as between maritime higher institutions and other key stakeholders.

Based on the results of the research it is quite clear that there is a lack of in programs of formal education. One of potential reasons for such situation is that programs of formal education are not in accordance with rapid technological development and do not include all competences needed for on-board job.

Courses help the crew to acquire new competences and/or to upgrade the already existing ones needed on specific types of ships and/or their equipment. Courses' contents differ depending on the type of the ship, its cargo, and navigation through certain areas, ships' equipment and demands of a company.

References

1. Caena, F. *Literature review. Teachers' Core Competencies: Requirements and Development. Education and Training, 2020*, European Commission Thematic Working Group 'Professional Development of Teachers' Brussels, European Commission. 2011.
2. Cicek, K., Akyuz, E., & Celik, M. *Future Skills Requirements Analysis in Maritime Industry*. Procedia Computer Science, 2019, 158, 270-274.
3. DeSeCo, O.E.C.D. *The Definition and Selection of Key Competencies*. Executive summary. 2005. Available at: <https://www.oecd.org/pisa/35070367.pdf>
4. Global LNG Fleet Market: Trends and Opportunities (2015-2019) - New Report by Daedal Research, available on: <http://www.slideshare.net/daedal/global-lng-fleet-market-trends-and-opportunities-20152019-new-report-by-daedal-research>
5. Gruppen, L. D., Burkhardt, J. C., Fitzgerald, J. T., Funnell, M., Haftel, H. M., Lypson, M. L., ...Vasquez, J. A. *Competency-based Education: Programme Design and Challenges to Implementation*. Medical education, 2016., 50(5), 532-539.
6. Gundić, A., Ivanišević, D., Zec, D. *Additional MET Programs for the Masters on board LNG Carriers*. In 7th International Conference on Maritime Transport: Technological, Innovation and Research Maritime Transport '16. 2016.
7. International Convention on Standards of Training, Certification and Watchkeeping for Seafarers - STCW, 1978., International Maritime Organization, 2010.
8. Manuel M. E. *Vocational and academic approaches to maritime education and training (MET): Trends, challenges and opportunities*, WMU Journal of Maritime Affairs, September 2017, Volume 16, Issue 3
9. Maritime 2050, Navigating the Future, Department for Transport, London, 2019. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/872194/Maritime_2050_Report.pdf
10. Mulder, M. *Conceptions of Professional Competence*. In International handbook of research in professional and practice-based learning. 2014. Pp. 107-137. Springer, Dordrecht.
11. Nanzhao, Z. *Competencies in Curriculum Development*. Z. Nanzhao.-Paris: UNESCO-IBE. 2005.
12. OECD, *Competency Framework*, 2014, Available at: https://www.oecd.org/careers/competency_framework_en.pdf

13. Oksavik, A., Hildre, H. P., Pan, Y., Jenkinson, I., Kelly, B., Paraskevadakis, D., & Pyne, R. (2020). *Future Skill and Competence Needs*, SkillSea, Project Report, 2020.
14. Pourzanjani, M., & Ali, A. *Latest trends in Maritime Education and Training (MET)*. In Proceedings of the 2nd International Maritime Conference on Maritime Threats & Opportunities in 21st Century. 2008
15. Ryaner, R.: *Competence Assurance for Ship's Crew*, IDESS Interactive Technologies, Splash, 2019. Available at: <https://splash247.com/competence-assurance-for-ships-crew/>
16. Sánchez, A. V., Ruiz, M. P. *Competence-based Learning*. A proposal for the assessment of generic competences, University of Deusto: Bilbao, 2008.
17. Wahba, M. *Competence Standards for Technical and Vocational Education and Training TVET*. 2013. Available at: <https://unevoc.unesco.org/e-forum/CompetenceStandardsforTVET.pdf>
18. BIMCO (2024), Crude Tanker Newbuild Contracting Jumps 490% as VLCC Orders Gain Pace, <https://www.bimco.org>. Accessed 8 March 2024.
19. CLIA (2023), State of the Cruise Industry, Cruise Lines International Association.
20. DNV (2024), Strong outlook for the tanker market in 2024 and beyond, <https://www.dnv.com>. Accessed 8 March 2024.
21. Goodwin Recruiting (2023), Hiring Advice, Industry News, Leadership. <https://www.goodwinrecruiting.com>. Accessed 2 March 2024.
22. Riviera Maritime Review (2024). <https://www.rivieramm.com>. Accessed 2 March 2024.
23. Shell LNG Outlook (2024). [LNG Outlook 2024 | Shell Global](#). Accessed 3 February 2024.