GreenShip Training The Trainees (GreenShip TTT)

Full Course and Short Courses in 'Shipboard Emission Management Training'

Course value:

Full Course: 7.5 ECTS/ECVET

Short Course: Updating for existing Officers managing emissions onboard ships 3 ECTS/ECVET

Course Level: NVQ 4

Duration of the Course:

Full Course: 60 Hrs nominal (40 Hrs of contact and 20 self-learning)

Short Course: Updating for existing Officers managing emissions onboard ships: 3 days

Introduction:

The purpose of this course is to develop an emission management job and training specification, and the development and implementation of an online leaning and assessment system for the new training programme so that current Cadets, as well as existing seafarers, can up-skill themselves to the new IMO regulatory requirements to fulfil;

1. the need for qualified personnel to implement emission regulations and mitigation technologies to achieve the best results.
2. the need for Energy Efficiency of shipping companies in order to achieve through cost savings and more efficient use of fuels, etc.
3. the mobility and enhance employability in the global labour market for EU seafarers and cadets who take the qualification either as part of their initial studies or as part of a continuing VET for career development.
4. IMO SEEMP and related requirements of MET providers (METs) for them to offer courses that are relevant and comply with latest regulations and requirements of the industry and address the new skill gaps that are emerging between traditional education and the latest technologies, requirements and practices for maritime energy efficiency.
5. the integration and development of e-Learning and digital skills into the EU MET's so that they can design and deliver e-learning materials as an online learning platform for the maritime officers who can truly benefit from online access to learning and training materials.

1. Ziarati et al (2017 – See reference 1
2. IMO TTT (2016) – see reference 2

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Summary of outcomes and assessment Criteria and references to the learning material

The assessment criteria are based on the learning outcome and the learning outcomes are devised in relation to the learning material organised in 6 GreenShip chapters. The chapters are based on De Melo et al (2021)[1] and IMO Train the Trainer (TTT) Course on Energy Efficient Ship Operation (2016)[2]**.** **T**he learners must complete all the outcomes fully to achieve a **Pass** grade. Assessment is based on demonstrating effective understanding and/or application of performance criteria for each outcome. The following table summarises the Learning Outcomes, references to the Learning Material and the assessment Criteria.

The courses consist of 6 Chapters:

Chapter 1

This chapter describes IMO and EU efforts and rule/regulations and provides targets and good examples of how energy is being saved, monitored and distributed for several ship types (containerships, tankers, bulk carrier and cruise ships.

Learning Outcomes:

Ability to:

- describe all IMO's and EU's emission measures and regulations and give practical examples of each measure and/or rule
- assess compliance with international legislations and requirements
- monitor different indices such as EEDI and EEOI
- assess compliance with inspection, approval and accreditations

Chapter 2

This chapter deals with the systems and sub-systems of emission production, dispersion and monitoring on board ships identifying the differences in each main type of ships.

Learning Outcomes:

Ability to

- identify the emission measures of different types/sizes of ships and their designs

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- assess safety concerns in different environmental conditions
- identify operational requirements at sea/in port and their environmental impacts
- assess fuel emissions from vessels such as CO_2, NOx, SOx and PMs from the combustion of fuels and their compliance with legislations
- identify different types of emissions generated from incinerated waste mainly from cruise vessels and compliance with environmental requirements

Chapter 3

This chapter focuses on the core part of the emission management programme i.e. how emissions are reduced to a minimum while maximizing energy efficiency, by means of, mechanisms such as slow steaming, wind direction and strength monitoring as well as energy saving records for future management decisions

Learning Outcomes:

Ability to

- implement ship's emission management systems
- assess different ship emission management options
- assess fuel emissions management systems of ships regarding CO_2, NOx, SOx and PMs from the combustion of fuels and their compliance with relevant legislations
- identify different types of waste discharges generated from incinerated waste mainly from cruise vessels in compliance with environmental requirements
- audit and inspection requirements including ISO 50001 and/or ISO 14001 as well as EU Monitoring, Reporting and Verification (MRV), and IMO fuel oil consumption data collection system
- develop the outline of company emission management plan in compliance with IMO SEEMP

Chapter 4

This chapter describes the marine propulsion system and emission monitoring.

Learning Outcomes:

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Ability to

- assess different ship propulsion systems
- examine the sources of emission from the engines
- evaluate emission generation and its use on board
- assess fuel emissions from ships regarding CO_2, NOx, SOx and PMs from the combustion of fuels and their compliance with legislations
- communicate and manage conflicts with ~~the~~ regard~~s~~ to effective and efficient use of engine energy usage
- develop the outline of a company engine emission management sub-plan in compliance with IMO SEEMP

Chapter 5

This penultimate chapter concerns navigation and examples of savings emanating from the application of good practices.

Learning Outcomes:

Ability to

- describe good practice in navigation that helps to save energy and reduce emissions
- provide guidance to crew with regards to any changes ~~in~~ at sea and weather conditions
- identify the navigation and operational requirements at sea/in port and their environmental impacts
- communicate and manage conflicts with the regards to effective and efficient use of overall use of energy

Chapter 6

The final chapter deals with fuel management through a range of methods including slow steaming.

Learning Outcomes:

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Ability to
manage fuel usage through a range of methods including slow steaming.

Outcomes	Learning Material	Assessment criteria
Learning Outcomes Chapter 1 Ability to: • describe all IMO and EU's emission measures and regulations and give practical examples of each measure and/or rule • assess compliance with international legislations and requirements • monitor different indices such as EEDI and EEOI • assess compliance with inspection, approval and accreditations	**Chapter 1** This chapter describes IMO and EU efforts and rules/regulations and provides targets and good examples of how energy is being saved, monitored and distributed for several ship types (containerships, tankers, bulk carrier and cruise ships.	To be able to: • Demonstrate understanding of climate system & global warming • Explain the requirements of combating air pollution & the role of International bodies • Describe different shipping structures, cargo types and characteristics
Learning Outcomes Chapter 2 Ability to • identify the emission measures of different types/sizes of ships and their designs • assess safety concerns in different environmental	**Chapter 2** This chapter deals with the systems and sub-systems of emission production, dispersion and monitoring on board ships identifying the differences in each main type of ships.	To be able to • identify the emission evaluation of different types/sizes of ships and their designs • assess safety concerns in different environmental conditions • describe operational requirements at sea/in port and their environmental impacts

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conditions • identify operational requirements at sea/in port and their environmental impacts • assess fuel emissions from vessels such as CO_2, NOx, SOx and PMs from the combustion of fuels and their compliance with legislations • identify different types of emissions generated from incinerated waste mainly from cruise vessels and compliance with environmental requirements		• Identify mitigating technologies for fuel emissions from vessels such as CO_2, NOx, SOx and PMs from the combustion of fuels and their compliance with legislations • describe different types of emissions generated from incinerated waste mainly from cruise vessels and compliance with environmental requirements
Learning Outcome Chapter 3 Ability to • implement ship's emission management systems • assess different ship emission management options • assess fuel emissions management systems of ships regarding CO_2, NOx, SOx and PMs from the combustion of fuels and their compliance	**Chapter 3** This chapter focuses on the core part of the emission management programme i.e. how emissions are reduced to a minimum while maximizing energy efficiency, by means of, mechanisms such as slow steaming, wind direction and strength monitoring as well as energy saving records for future management decisions	To be able to • explain ship's emission management systems • assess different ship emission management options • assess fuel emissions management systems of ships regarding CO_2, NOx, SOx and PMs from the combustion of fuels and their compliance with relevant legislations • identify different types of waste discharges generated from incinerated waste mainly from cruise vessels in compliance with environmental requirements

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with relevant legislations • identify different types of waste discharges generated from incinerated waste mainly from cruise vessels in compliance with environmental requirements • audit and inspection requirements including ISO 50001 and/or ISO 14001 as well as EU Monitoring, Reporting and Verification (MRV), and IMO fuel oil consumption data collection system • develop the outline of company emission management plan in compliance with IMO SEEMP		• audit and inspection requirements including ISO 50001 and/or ISO 14001 as well as EU Monitoring, Reporting and Verification (MRV), and IMO fuel oil consumption data collection system • describe the outline of company emission management plan in compliance with IMO SEEMP
Learning Outcome Chapter 4 Ability to • assess different ship propulsion systems • examine the sources of emission from the engines • evaluate emission generation and its use	**Chapter 4** This chapter describes the marine propulsion system and emission monitoring.	To be able to • describe different ship propulsion systems • identify the sources of emission from the engines • identify a mitigating solution for various ship emissions on board a verssel • Describe the monitoring systems for fuel emissions from ships regarding CO_2, NOx, SOx and PMs from the combustion of

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on board • assess fuel emissions from ships regarding CO_2, NOx, SOx and PMs from the combustion of fuels and their compliance with legislations • communicate and manage conflicts with regards to effective and efficient use of engine energy usage • develop the outline of a company engine emission management sub-plan in compliance with IMO SEEMP		fuels and their compliance with legislations • communicate and manage conflicts with regards to effective and efficient use of engine energy usage • describe the outline of a company engine emission management sub-plan in compliance with IMO SEEMP
Learning Outcome Chapter 5 Ability to • describe good practice in navigation that helps to save energy and reduce emissions • provide guidance to crew with regards to any changes in at sea and weather conditions • identify the navigation and operational requirements at sea/in port and their environmental impacts	**Chapter 5** This penultimate chapter concerns navigation and examples of savings emanating from the application of good practices.	To be able to • Understand how e-navigation works • Describe how weather routing is used in passage planning • Identify key factors in e-navigation and weather routing that can save fuel

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• communicate and manage conflicts with the regards to effective and efficient use of overall use of energy		
Learning Outcome 6 - Able to manage fuel usage through a range of methods including slow steaming.	**Chapter 6** The final chapter deals with fuel management through a range of methods including slow steaming.	To be able to a. Demonstrate fuel usage through at least six methods including slow steaming.

Assessment Strategy

Evidence may be generated through a variety of assessment methods such as assessments, tests, examinations or face-to-face interview.

Each outcome may be tested separately or integrated successfully to carry out tasks.

The length of time allocated to each outcome and the amount of time suggested for self study and tests may be adapted by instructors to suit individual groups of trainees, depending on their previous experience, their individual learning needs, their ability to demonstrate their knowledge of technical areas. The value of tests will depend primarily on how they are used to establish test content by carefully sampling from the domain of the test. This should include a set of practical and real world tasks with particular known roles or work skills setting rather than abstract contrast.

The model answer in such cases must be clear to display what is acceptable and what is not acceptable.

The procedure for scoring is critical against which the performance will be judged. It must be clear for each outcome.

A test may be fixed for a period of time or may be a continual process to evaluate the performance of the learner.

Links

1. Ziarati et al (2017 – See reference 1
2. IMO TTT (2016) – see reference 2

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This unit is intended to integrate the skills and knowledge developed in many of the other Engineering units. In particular, it will use and develop themes of watch-keeping, emergency response and general communication.

Resources

GreenShip Learning Chapters and GreenShip online course materials

Suitable classroom facilities. Notes on STCW requirements, Use of recorded messages and video tapes in listening classes.

IMO relevant Publications – Ziarati et al (2017)

Suggested reading

1. G. de Melo, R. Ziarati and H. Koivisto, "Towards Zero ship Emissions II - Project Greenship," in *The International Association of Maritime Universities Congress 2021*, Alexandria, Egypt, 2021.
2. Ziarati et al, the case for MarIEMS Project, Maritime Energy Management Training Strategic Partnership (MariEMS). Project Number: 2015-1-UK01-KA202-013733.
3. IMO Train the Trainer (TTT) Course on Energy Efficient Ship Operation [Viewed on 29th Oct 2016].
4. Wikipedia 2015, "Seafarer's professions and ranks", http://en.wikipedia.org/wiki/Seafarer's_professions_and_ranks accessed August 2015.
5. http://www.imo.org/en/OurWork/Environment/PollutionPrevention/AirPollution/Documents/Air%20pollution/M4%20energy%20management%20onboard%20final.pdf
6. NASA/Goddard, *Last Updated: July 31, 2015, editor: Holly Zell* http://www.nasa.gov/mission_pages/sunearth/science/atmosphere-layers2.html
7. 1 UNEP,http://www.unep.org/Documents.Multilingual/Default.asp?DocumentID=43
8. M1 Climate Change and the Shipping Response Module 1 – Page 26
9. United Nations Framework Convention on Climate Change, [Viewed 28th October 2016]. Available from: http://unfccc.int/kyoto_protocol/items/2830.php
10. Available from http://www.imo.org/en/OurWork/Environment/PollutionPrevention/AirPollution/Pages/IMO-Train-the-Trainer-Course.aspx
11. Mohit Sanguri, "Energy Conservation in Boilers and Making an Audit Report"
12. http://www.marineinsight.com/marine/marine-news/headline/energy-conservation-inboilers- and-making-an-audit-report/
13. Bazari Z, 2012, "Ship Energy Efficiency – Developments and Lessons Learnt", Lloyd's Register,
14. LRTA publication, November 2012.
15. Machinery Spaces.com "Feed systems for auxiliary boilers and steam turbines - operating
16. "principle", http://www.machineryspaces.com/feed-system.html, accessed August 2015.

1. Ziarati et al (2017 – See reference 1
2. IMO TTT (2016) – see reference 2

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15. Carbon Trust, 2012, “Steam and high temperature hot water boilers”, Carbon Trust UK. publication, 2012.
16. Alfa Laval, “Efficiency in boilers and beyond”, http://www.alfalaval.com/globalassets/documents/industries/marine- and transportation/marine/whr.pdf, Alfa Laval document, accessed August 2015.
17. “IMO train the trainer course material”, developed by WMU, 2013. Viewed on 2nd Nov, 2016.
18. OCIMF 2011, “Example of a Ship Energy Efficiency Management Plan”, submitted to IMO by Oil Companies International Marine Forum (OCIMF), MEPC 62/INF.10, April 2011.
19. Ziarati et al, 2015, MariEMS Project proposal, 2015
20. Ziarati, R., and Akdemir, B., 2017, MariEMS – Maritime Energy and Management System, MariFuture Article, December 2016 http://www.marifuture.org/Publications/Articles/MariEMS%E2%80%93Maritime_Energy_and_Management_System.pdf,
21. Ziarati et al, MARITIME ENERGY MANAGEMENT SYSTEM (MARIEMS) ONLINE DELIVERY PLATFORM, IAMU 2017, September 2018 (http://www.marifuture.org/Publications/Papers/IAMU_MariEMS.pdf)

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2. IMO TTT (2016) – see reference 2

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