

IMO Train the Trainer (TTT) Course
on
Energy Efficient Ship Operation

Trainers' Manual



ACKNOWLEDGEMENTS

The “Train the Trainer” course presented herein is based on material originally developed by WMU in 2013 under contract for the IMO. This current edition represents a major upgrade of the training package by Dr Zabi Bazari of Energy and Emissions Solutions, UK (EnEmSol) under contract for the IMO.

IMO wishes to express its sincere appreciation for WMU and EnEmSol expert assistance

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Trainers' Manual

Foreword

This Trainers Manual (Manual) is developed for use by those who have undergone the full “Train the Trainer (TTT) course” training on “Energy Efficient Ship Operation” as “Trainers”; plus others who intend to deliver the same course or a customized course based on technical content of the TTT course in their own country or region.

The Manual is intended to provide the following aspects:

- An overview of the TTT course from all aspects including implementation point of view;
- Some guidance on how to develop or customise a training course based on the TTT course technical content;
- Some guidance on pedagogic and how to deliver the course; and
- A full list of relevant resources available.

The main intention is to support the Trainer with his/her follow-on work after undergoing the TTT course. Additionally, this Manual is regarded as the main reference document that could be used for identifying all aspects of the TTT course content and resources.

This Manual does not provide any technical details of the course; i.e. on how to operate a ship in an energy efficient way. These aspects are already fully covered under Module 1 to Module 6 of the TTT course [1]; that are collectively referred to as course-book in this Manual. This Manual also does not fully deal with teaching methods and pedagogic aspects as these are covered in another publication [2].

It is not the intention of this Manual to present Trainers with a rigid “teaching package”, “teaching rules”, “teaching resources” and/or “teaching methodologies and styles” that must be exactly followed. Some degree of customisation of the resources will be needed anyway in order to adapt them to the requirements of various trainees in different regions.

Because the knowledge and the cultural backgrounds of trainees may vary considerably from country to country and from one group to another group, the TTT course has been designed to cover the basic technical requirements of the subject in universally applicable terms. However, specific details on customization, in particular on the way the course is delivered are left to Trainers to decide using general guidelines given in this Manual.

The material presented herein is current at the time of preparations of this document. Because of the evolving nature of regulations, technologies and future studies in area of MARPOL Annex VI and in particular energy efficiency of ships, some aspects may require updating over time.

The views expressed in this document are purely those of the author(s) and may not in any circumstances be regarded as stating an official position of the organizations involved or named in this document.

This document is subject to change by the IMO.

Dr Zabi Bazari, EnEmSol, January 2016

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1 Purpose of the Trainers Manual

The purpose of this Trainers Manual is to assist training providers and trainers in developing, organizing and delivering the technical content of the IMO Train the Trainer (TTT) course or any new training courses based on the TTT course that aim to promote awareness, enhance knowledge and best practice methods for implementation of MARPOL Annex VI in particular its Chapter 4 on energy efficiency for ships and related efforts for mitigation of GHG from national and international shipping.

The TTT course primarily aims at developing countries and targets both the training of qualified Trainers at one hand and subsequent delivery of related courses by these Trainers based on technical content of the TTT course.

This Manual specifically aims to provide details related to the following topics:

- An outline of the TTT course technical content and relevant resources that are available to aid its delivery;
- Guidance on development of customized training courses based on technical content of the TTT course for subsequent delivery by Trainers;
- An overview of the effective teaching methods and pedagogic aspects; and
- A full list of relevant resources available.

This Manual does not provide any technical details of the course as these are already fully covered under Module 1 to Module 6 of the TTT course that are collectively referred to as course-book in this Manual [1]. This Manual also does not fully deal with teaching methods and pedagogic aspects as these are covered in another publication [2].

It is not the intention of this manual to present Trainers with a rigid "teaching package, "teaching rules" and/or "teaching instructions" that they are required to exactly follow. The Manual is written under the assumption that the Trainer will be physically present to deliver the course. It is assumed that the physical presence of the Trainer and his/her training endeavours, knowledge, skills and dedication are key components in the transfer of knowledge and skills to those being trained.

Because the knowledge and the cultural backgrounds of trainees (those participants taking part in the training course) may vary considerably from country to country and from one group to another group, the TTT course has been designed to cover the basic technical requirements of the subject in universally applicable terms. However, specific details on customization, in particular on the way the course is delivered are left to Trainers or Instructors to decide using general guidelines in this Manual.

2 The TTT Course

In this section, an overview of the IMO TTT course on "Energy Efficient Ship Operation" is given. It aims to provide the prospective Trainers with the framework under which the TTT course is developed, planned and should be delivered. A good understanding of this framework will help the Trainer to better deliver the technical content of the TTT course or customize the course to his/her own requirements.

2.1 The TTT course objectives

The IMO TTT course is designed to facilitate the development of Trainers at global levels, and in particular in developing countries, for delivery of training and capacity building workshops for promoting ship energy efficiency; with prime objective of reducing GHG emissions from

international and national shipping as well as reducing fuel costs. In a nutshell, the course aims to promote eco-shipping, in particular in developing countries.

The course contributes to the IMO's environmental protection goals as set out in resolution A.947(23) on development of "human element" in maritime industry [3] and resolution A.998(25) on the need for capacity building [4]. The other objective is to help with proper implementation of MARPOL Annex VI in particular its Chapter 4 on energy efficiency for ships. This course also significantly contribute to the activities relating to the promotion of technical cooperation and capacity building for ships' energy efficiency as embodied in Regulation 23 of MARPOL Annex VI as well as MEPC Resolution 229(65) on "promotion of technical co-operation and transfer of technology relating to the improvement of energy efficiency of ships" [5].

The course at its core deals with energy efficient ship operation; however the content includes regulatory requirements as well as technology upgrades; both of which are related to core topics. A significant amount of resources are developed for delivery of this training course and these resources will also be introduced in this Manual.

The course will support the implementation of various regulations via training of experts in particular in developing countries; such experts that in turn could champion the GHG reduction activities. IMO intends not only to train a number of "Trainers" from developing countries as champions of maritime GHG emissions mitigation but also endeavours to equip them with techniques to design and develop their own related courses based on resources provided by this TTT course.

2.2 The TTT course "technical content"

The TTT course, in terms of technical content, comprises of six study modules:

- **Module 1:** Climate change and the shipping response
- **Module 2:** IMO energy efficiency regulations and related guidelines
- **Module 3:** From management to operation
- **Module 4:** Ship board energy management
- **Module 5:** Ship port interface and energy efficiency
- **Module 6:** Energy management plans and systems

Figure 1 provides the six modules of the course and shows how they relate to each other. These six modules collectively are referred to as the "course-book" in this manual. **Figure 1** also provides an overview of each module. As indicated, the course at its core deals with energy efficient ship operation, however the content includes regulatory requirements as well as technology upgrades; both of which are quite relevant to ship operation.

This course is relevant to all shipping companies, maritime administrations and maritime training institutes in shipping nations. In particular, it is within the scope of supporting developing countries in promoting their capacity in implementing regulations and improving their ship operation management for energy efficiency.

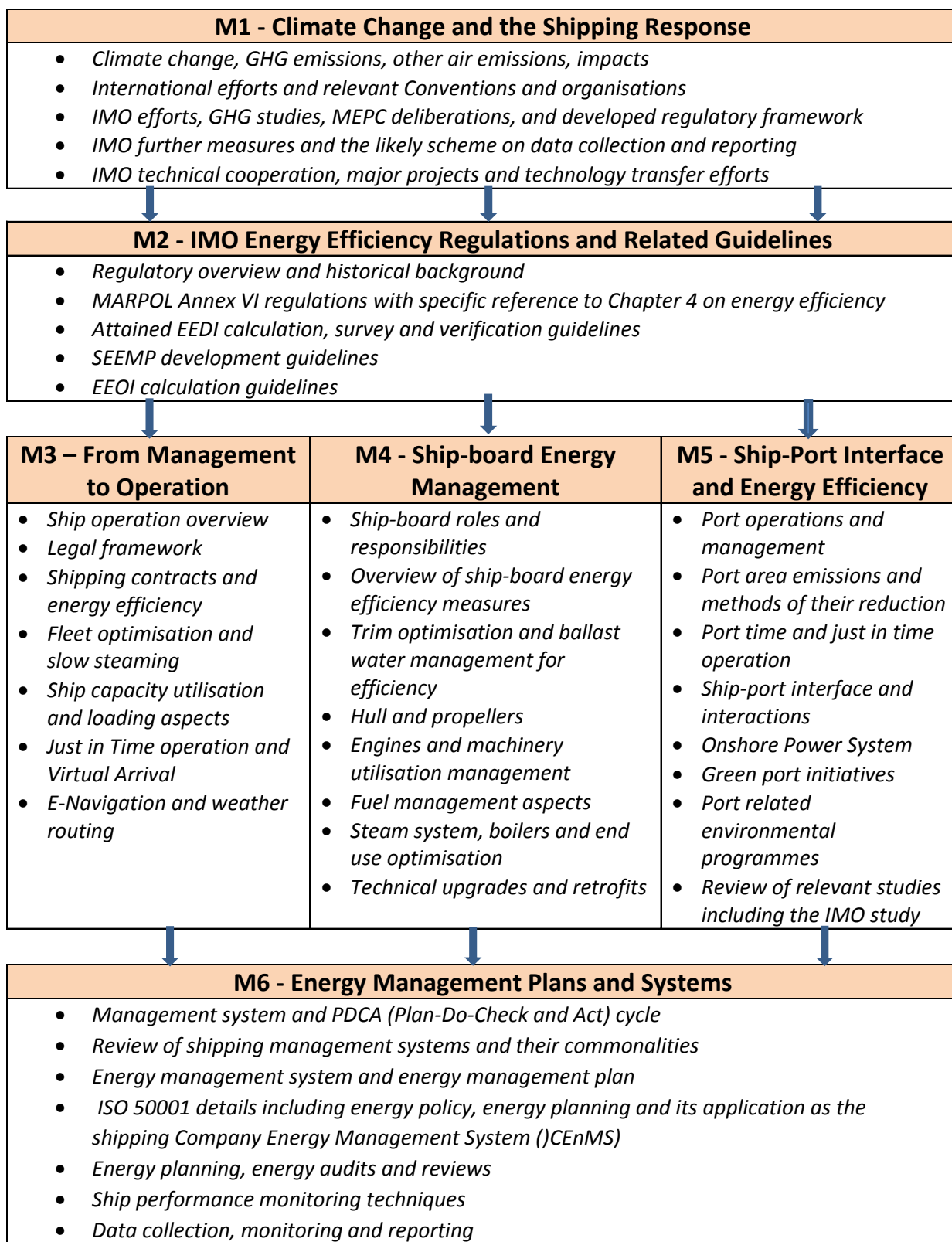


Figure 1 - The TTT course modules and their contents (course-book)

A summary of modules' contents as well as their learning objectives are given in **Appendix 1**. The full text for each module can be found on the IMO website.

2.3 Course outline and timetable

Appendix 2 shows the proposed training plan/programme for the 5-day TTT course. The five day includes three days of delivery of course-book (technical content) and two days of becoming familiar with teaching methods (pedagogic). This is based on experience with previous delivery of such a course at WMU.

If the training programme is only based on technical content of the TTT course, the delivery period will be three days (i.e. a 3-day energy efficient ship operation course). For this 3-day course, a typical plan/programme as shown in **Appendix 3** may be used. The plan/programme provided in **Appendices 2** and **3** are for information and guidance and may be revised prior to delivery of the course by the course organisers and instructors. Thus, it is up to the responsible organizations / trainers to devise a more accurate plan, schedule or programme for their training courses. Despite this, it is expected that for delivery of the full course-book of the TTT course, the plan developed should not be significantly different from those proposed plans in **Appendices 2** and **3**.

2.4 Additional resources

A significant number of resources are developed for the effective delivery of the technical content of the TTT training course. These resources include the following.

2.4.1 Trainers Manual (this document)

As indicated, this Manual is developed to help the Trainers to deliver the same course or a customized course based on technical content of the TTT course in their own country or region. It provides main aspects of how to develop the training plans or workshop programmes and how to implement and evaluate. Thus this is the main reference document that could be used for identifying all aspects of the TTT course content and resources.

2.4.2 Pedagogic guidelines

A full textual pedagogic guidelines document is developed to help future Trainers to become familiar with the art and techniques of knowledge transfer in a class room environment in particular to adult learners [see reference 2]. These guidelines specify the art and science of helping adults learn by assuming that adult learners are more experience-based learners and are keen to see the relevance of what they are learning. Their motivation to learn differs from normal students and strongly linked to the perceived meaningfulness, applicability and benefits of their learning material.

2.4.3 Master Power Point presentations

For each module, a master Power Point presentation is prepared with notes to help the future Trainers to use and customize to their requirements. In total, six of such Power Points are prepared. The Power Points need to be customised to Trainers' requirements and style. It is highly recommended that the Trainers/Instructors to familiarise themselves with these slides and amend them as required before their presentations.

2.4.4 EEDI Calculator

A relatively sophisticated training-oriented EEDI calculator is developed and prepared as an aid to training process. The calculator aims to give a full understanding of the EEDI calculation formulas to the trainees via using a number of case examples in conjunction with their related EEDI Technical Files and carry out the actual calculations on their own laptop / devices.

The calculator has the following general specification:

- The calculator is based on the following IMO regulations and guidelines and corresponding EEDI calculation formulas;

- For Required EEDI, regulation 22 of MARPOL Annex VI and relevant formulations and data tables are applied; and
- For Attained EEDI, IMO MEPC Resolution MEPC.245(66) is used as the basis for the calculation formula;
- To use the calculator, the user must be familiar with the above regulation, guidelines and the formulas;
- The calculator is Excel-based and is split into various spread sheets to enable easy understanding and use of the calculator; and
- References are made to relevant paragraphs of regulations and IMO guidelines for definition of parameters and calculation formulas for ease of understanding by the trainees.

2.4.5 Pre-training assignments

As part of the entry requirements, it is important that trainees who intend to attend the TTT course or any customized course are generally familiar with the subject and are mentally ready for the course. This can be achieved via engagement of the trainees on related subjects before their attendance. For this purpose, it is highly recommended that they carry out some pre-training or pre-workshop assignments.

To help with this process, a number of such assignments are prepared in the form of a "textual document" to be read and a "relevant questionnaire" to be filled. By reading the text and filling the questionnaire, this initial familiarization of the trainee with the subject is achieved. Although these resources are already usable, it is worthwhile to mention that the Trainers or Instructors are free to change the pre-workshop assignment if they find a more appropriate option.

2.4.6 Course exercises

A number of course exercises are developed for use for training purposes. The exercises are sorted according to the course modules and example titles can be seen in **Appendix 4** for quick reference. The full content of exercises is provided in a separate document.

These exercises could be customized if need be or prospective Trainers/Instructors may devise their own practical exercises for the purpose.

2.4.7 Publicity posters

A number of posters are developed in short textual-diagrammatical formats to help Trainers in conveying the training main messages. These posters may be installed in the training room or used as appropriate by the Trainer.

The appropriate use of the above resources is important for an effective delivery of the course. All the above resources could be downloaded from the IMO website.

2.5 Entry standards

Entry to the course to become a "Trainer" is open to those engaged in maritime industry inclusive of shipping industry and maritime Administrations in particular to those individuals who intend to deal as experts on marine environment, air emissions, GHG emissions and climate change. Additionally, staff from maritime training institutes as well as private engineering consultancy companies in particular SMEs (Small or Medium Enterprises) need to be taken into account and their attendance should be encouraged.

Although the choice of individuals to participate in such training courses is left mainly to relevant authorities, it is important that candidates show willingness for longer term engagement as a Trainer on the subject. Some general criteria for admission are:

- Willingness to act as a Trainer in the future;
- Adequate proficiency in English;
- Experience with ships and shipping;
- Experience or knowledge of MARPOL Annex VI; and
- Track record of interest in learning and training.

It is not always possible for a candidate to meet the entry standards from some perspectives. In such a case, those individuals should be required to complete another course or programme of self-learning to raise their standard to the stated entry level. Alternatively, those parts of the course affected could be augmented by inserting course material which will cover the knowledge required.

Preparatory material for the trainees can range from refresher notes, selected topics from textbooks and reading of selected technical papers or IMO documents, through to attendance in formal courses. It may be necessary to use a combination of preparatory work and the TTT course material in modified forms. It must be emphasized that where the TTT course material involves items such as MARPOL Annex VI regulations, some parts of the regulation could be the subject of the pre-assignment work (see resources in **Section 2.4.5**). In any case, ensuring that entry standards are met is the responsibility of those organizations that are tasked to deliver the TTT course.

2.6 Course intake limitations

To make the training course effective for Trainers' development, the number of participants in the class should not exceed twenty (20). As the course contains some practical activities based on group discussion, group exercises, as well as the use of tools/exercises (e.g. EEDI calculator) (see **Sections 2.4.4 and 2.4.6**), the total number of the participants should not be less than eight (8) as otherwise it will be difficult to promote active discussion within the group.

2.7 Instructors' requirements

All training and instructions should be given by properly qualified personnel. To run the TTT course inclusive of pedagogic aspects, at least three (3) instructors are needed with main expertise in the following disciplines:

- Naval architecture or ship operation management with full insight and experience in shipping energy efficiency;
- Marine engineering or ship technical management with full insight and experience in shipping energy efficiency;
- Pedagogic expert for aspects that includes best methods on transfer of knowledge to others.

The above are minimal and depending on which institution delivers the TTT course, the total number of instructors could go as high as six (6) that would provide more detailed and in-depth expertise on various topics covered in the TTT course-book.

The instructors for delivery of the course shall have appropriate knowledge and skills in training techniques (preferably with a certificate in TTT course or similar background experience of industrial or vocational or academic training) for delivering lectures in the classroom as well as practical activities utilizing case examples and studies. The instructors should have a clear track record indicating that they have the necessary knowledge, qualification and experience in the energy efficient operation and design of maritime systems and technologies.

The TTT course instructors should study carefully this Manual, the course plan/programme, the course-book and associated resources. This is vital if a clear understanding is to be obtained of what is required, in terms of resources necessary to successfully implement the course. The instructors are best to construct notes or lesson plans to achieve these outcomes.

Course coordinator

It is important that an experienced person amongst the instructors, preferably someone with experience in course and curriculum development, is given the responsibility of coordinating the delivery of the course. Such a person is often termed a "course coordinator" or "course director".

Instructors involved in presenting the course will need to be properly briefed about the part of the course they will be dealing with by the course coordinator, and a system must be set up for checking the material they may be required to prepare. To do this, it will be essential to make a thorough study of the plan/programme and apportion the parts of the course-book according to the abilities of the staff called upon to present the work.

The course coordinator / course director should consider monitoring the quality of teaching in such areas as variety and form of approach, relationship with trainees, and communicative and interactive skills; where necessary.

2.8 Preparations, teaching facilities and equipment

The success of any training depends heavily on thorough and effective preparations. Although the IMO TTT course has been made as comprehensive as possible, it is nonetheless vital that sufficient time and resources are devoted to preparation. Preparation not only involves matters concerning administration or organization, but also includes the preparation / customisation of any course notes, drawings, sketches, power points presentations, etc. as may be deemed to be necessary and as may increase the instructor's effectiveness as a trainer.

For delivery of the main lectures and interactions between trainers and participants, a properly organized training room equipped with at least a computer projector and a flipchart (or equivalent) is required. A computer driven projector is the necessity as this can be used to demonstrate practice and displays of software tools is a standard requirement. The room is preferred to be equipped with sound system including microphones for improved communications.

For the practical exercises, and in particular the use of EEDI calculator, the TTT course participants are required to have access to laptops or similar system to be able to run the calculator and practically use it. Also, existence of facilities for break-out sessions is highly recommended. For the TTT course itself and in particular for the last day presentations, a number of separate rooms will be needed for presentation of various working groups.

2.9 Trainees' pack

The TTT course resources as outlined in **Section 2.4** are prepared as teaching aids and will be used throughout the delivery of this TTT course by the instructors. The same resources could also be used by prospective Trainers after taking part in the TTT course.

A large number of references are identified in various sections of the TTT course-book modules. For the sake of brevity of this manual, their list will not be repeated here. These references may be used by trainers and trainees as required.

In any case, it is proposed that each trainee that takes part in the "IMO TTT Course" is supplied, as a minimum, with the following resources in digital format in order to support their after-training activities:

- A copy of course-book (6 technical modules);
- The core IMO regulatory resolutions and guidelines;
- A hardcopy book of MARPOL Annex VI and NOX Technical Code (Consolidated English Edition 2013 or later dates);

- A copy of the Second IMO GHG Study 2009 and the Third IMO GHG Study 2014;
- All the Power Point presentations; and
- Copy of this Trainers Manual and pedagogic part.

Although access to the above resources is possible via IMO website, it is recommended that the trainees receive these documents first hand and during the training activities.

2.10 Course certificate, evaluation and reporting

2.10.1 Certificate

Participants completing the course satisfactorily should be issued with a certificate of participation or a document describing the objectives of the course and attesting their successful completion of it.

Where a certificate is to be issued to trainees, the organizer should ensure that this is available and properly worded and that the industry and authorities concerned are aware of its purpose and intent. It is best to implement the course with support from authoritative organizations so that their logos could be used on the training certificate. In any case, references to “IMO TTT Course” should be mentioned in the relevant certificate if the deliveries comply with the TTT course modules technically and this Manual from implementation perspective.

2.10.2 Evaluation

As part of the formal course evaluation, it is important to seek the view of the trainees. This is normally done via a questionnaire. If the course is delivered under IMO and or supported by IMO funding, the evaluation is standard and each trainee will be required to complete an evaluation form towards the end of training as per **Appendix 5**. For non-IMO courses, other type of feedback forms may be used.

2.10.3 Reporting

Reporting of the way the training executed is an important aspect of capturing the learning process and conduct of training. The course director or another assigned person should aim to prepare the final report of training that would include all the details of the training conducted. As a minimum, the following should be included in the report:

- Training aims and objectives;
- Details of the organizers, sponsors, lecturers, etc.;
- List of participants and their affiliations;
- Training schedule/plan/programme;
- A short description of various lectures and exercises given;
- A summary of the evaluation results.

3 New Course Development based on the TTT Course Resources

3.1 Introduction

This section provides general guidelines for the Trainer on how to deliver a customised training course based on course material and resources of the TTT course. This could be the case when the Trainer intends to deliver his/her own courses for awareness raising or training on the subject. In such a case, the main concentration will be on the technical content of the TTT course, its

customisation and delivery. The pedagogic aspects will not be delivered under such a case, thus is out of scope of this section.

3.2 Development process for a customised training course

To design the own customized training course on the subject of shipping energy efficiency and GHG emissions using the TTT course package and its resources including this Manual, it is proposed to consider a step by step approach as follows:

- Step 1 – Understand the existing TTT course plan and course-book and resources;
- Step 2 – Assess participants profile and other requirements for your course;
- Step 3 – Review and amend the TTT course plan to suit your participants’ requirements;
- Step 4 – Customize resources;
- Step 5 – Organize the training;
- Step 6 – Deliver the training; and
- Step 7 – Evaluate and receive feedback from trainees and reporting.

Further details of the above are provided in the following texts.

3.3 Step 1- Understand the existing TTT course plan

Review the existing course plan for the full TTT content as developed in this Manual; see **Section 2** and relevant **Appendices**. As part of this review, the full content of the training package including various resources should be fully understood by the course planner (Trainer). As the Trainer has most likely already successfully completed the TTT course, this task of understanding the full scope of the TTT course and relevant resources should be achieved at minimal time.

The outcome of the step 1 will be a full understanding of the TTT course plan, course-book, its resources and how they should be delivered.

3.4 Step 2 – Assess participants profile and other requirements for your course

Under this step, the main purpose and needs of the prospective participants of your training course should be evaluated. Based on this assessment, a list of requirements can be defined that will form the basis for any customization or method of delivery of the training course. Based on this, your course’s “entry standards” as well as overall objectives, scope and requirements will be defined.

3.5 Step 3 – Amend the TTT course plan to suit your participants’ requirements

Based on entry standards and other requirements defined and the actual level of knowledge and skills and the previous technical knowledge of the participants, the existing course plan will be devised. **Appendix 3** provides a sample course plan or workshop programme based on existing material in the TTT course (assuming that the full course-book is going to be delivered). This plan/programme may be modified and adjusted as part of planning your training programme

Any areas within the detailed syllabus which may cause difficulties because of differences between the actual participant entry level and that assumed by the TTT course, should also be identified. To compensate for such differences, the Trainer is expected to delete from the course, or reduce the emphasis on, items dealing with knowledge or skills already attained by the participants. The Trainer should also identify any academic knowledge, skills or technical training which participants may not have previously acquired.

As a result and by analysing the detailed syllabus and the knowledge background required to allow training to proceed, the Trainer can design an appropriate course plan/programme using the TTT course plan and other resources. It should be noted that adjustment of the course objectives, scope and content may be necessary if, within the respective country, region or industry, the participants

completing the course are to undertake duties which differ from the objectives specified in the TTT course.

The outcome of the step 3 will be the new course plan / programme.

3.6 Step 4 – Customize resources

Under this step, the TTT course resources (described fully in **Section 2.4**) including the following may need to be customized to the new course requirements:

- TTT course-book;
- TTT course presentations;
- TTT course pre-training assignment;
- TTT course exercises; and
- Etc.

It is highly recommended that the customization of the course-book is avoided as this may require significant time. Instead, if need be, the delivery of certain modules may be avoided based on the new course plan and requirements. The customization of other resources could be undertaken and may benefit the Trainer also with his/her style of training and his/her knowledge background (in particular the customisation of the Power Point presentations as well as the exercises).

The outcome of the step 4 will be the customized resources for the training. At this stage, the Trainer’s “technical preparations” are complete. Next steps will include organizing, delivering and evaluating the training course. Having adjusted the course content to suit the participant intake and any revision of the course objectives, the Trainer should draw up lecture plans based on the detailed plan/programme. For this purpose, there may be a need to go through some cycles in steps 1 to 4 to ensure that course plan, course-book and resources are compatible.

3.7 Step 5 – Organize the training

For the course to run smoothly and to be effective, considerable attention must be paid to the availability and use of:

- Properly qualified trainers;
- Support staff;
- Venue for the training;
- Equipment e.g. projectors and sound system; and
- Handouts, training package and other reference materials.

Thorough preparation is the key to successful implementation of the course. The topics covered in **Section 2** with regard to instructors and other aspects equally apply to this customized training.

3.8 Step 6 - Deliver the training

The presentation of concepts and methodologies must be repeated in various ways until the Trainer is satisfied that the trainees / participants have attained each specific learning objective or outcome. During delivery, the Trainers should ensure that the participants acquire the learning objectives as specified under various items of the course-book modules. When delivering the course, attention to Pedagogic aspects is essential (see **Section 4**).

3.9 Step 7 - Training certificate, evaluation and reporting

Where a certificate is to be issued to trainees, the organizer should ensure that this is available and properly worded and that the industry and all authorities concerned are aware of its purpose and intent. Issue of a recognised certificate, evaluation of the trainees’ feedback and reporting of the way the training conducted are essential activities.

The topics covered under the TTT course in **Section 2.10** are equally applicable to the customised course as well and thus the reader are referred to this section.

4 Teaching Techniques and Pedagogic Aspects

4.1 Overview

One aspect of the TTT course is to familiarize the Trainers with pedagogic and effective teaching styles. In this section, short instructions on teaching techniques are provided. Full details of pedagogic aspects are given in a separate document [2].

Poor preparation is a sure way to lose the interest of a group in particular the trainees. Preparation involves a number of activities such as full identification and appreciation of the subject to be delivered and preparations for its effective delivery. Also, identification of all other aspects discussed such as training resources, ensuring that the venue and its amenities are appropriate, etc., together with support staff necessary for its operation are essential.

4.2 Preparations

It is essential to use a "lesson plan", which can provide a simplified format for coordinating lecture notes and supporting activities. The lesson plan breaks the material down into identifiable steps, making use of brief statements, possibly with keywords added, and indicating suitable allocations of time for each step. The use of audio-visual material should be included at the correct point in the lecture with an appropriate allowance of time. The audio-visual material should be test-run prior to its being used in the lecture.

Check the rooms to be used before the lecture is delivered. Make sure that all the equipment and apparatus are ready for use and that any support staff are also prepared and ready. In particular, check that all black/white boards are clean and that a supply of writing and cleaning materials is readily available. If exercises require extra resources such as post-it notes, breakout areas, etc. ensure that all these resources are readily available before the start of the training. In addition to the core course material and relevant presentations, **Figure 2** shows a good list of preparations.

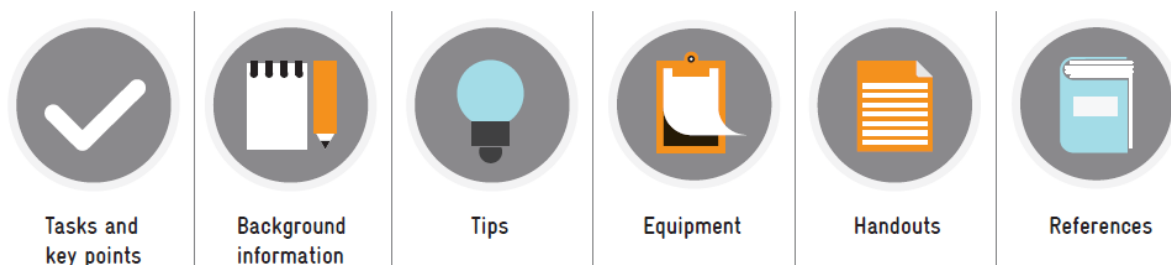


Figure 2 – Preparation is key to a successful delivery

4.3 Delivery

On the delivery side and in the class, the Trainer is best [6]:

- Always face the people you are talking to and avoid talk with your back to the group;
- Talk clearly and sufficiently loudly to reach everyone;

- Maintain eye contact with the whole group as a way of securing their interest and maintaining it (i.e. do not look continuously at one particular person, nor at a point in space);
- People are all different, and they behave and react in different ways. An important function of a Trainer/Instructor is to maintain interest and interaction between members of a group;
- Some points or statements or facts are more important than others and should therefore be emphasized. To ensure that such points or statements are remembered, they must be re-stated a number of times, preferably in different words;
- If a white board or flipchart is to be used, any writing on it must be clear and large enough for everyone to see. Use colour to emphasize important points, particularly in sketches;
- It is only possible to maintain a high level of interest of participants for a relatively short period of time; therefore, break the lecture up into different periods of activity to keep interest at its highest level. Speaking, writing, sketching, use of audio-visual material, questions, and discussions can all be used to accomplish this. When a group is writing or working on exercises, walk amongst the group, looking at their work, and provide comment or advice to individual members of the group when necessary;
- When holding a discussion, do not allow individual members of the group to monopolize the activity, but ensure that all members have a chance to express opinions or ideas;
- If addressing questions to a group, do not ask them collectively; otherwise, the same person may reply each time. Instead, address the questions to individuals in turn, so that everyone is invited to participate;
- It is important to be guided by the training plan/programme content and not to be tempted to introduce material which may be too advanced, or may contribute little to the course objective; and
- Finally, effective preparation makes a major contribution to the success of a lecture. Things often go wrong; preparedness and good planning will contribute to putting things right. Poor teaching cannot be improved by good accommodation or advanced equipment, but good teaching can overcome any disadvantages that poor accommodation and lack of equipment can present.

4.4 Pedagogic aspects

The detailed aspects of the teaching methods and styles and pedagogic aspects for delivery of an effective training are covered in another publication [2].

5 References

1. IMO Train the Trainer Course, "Course-book inclusive of 6 training modules"; Authored by Zabi Bazari, released January 2016.
2. IMO Train the Trainer Course, "Trainer's Manual, Part II – Pedagogic", Authored by Anne Pazaver, released May 2013.
3. Resolution A.947(23), "Human Element Vision, Principles and Goals for the Organization", Adopted on 27 November 2003 by the IMO Assembly.
4. Resolution A.998(25) "Need for Capacity-Building for the Development and Implementation of New, and Amendments to Existing, Instruments", Adopted on 29 November 2007 by the IMO Assembly.

5. MEPC Resolution 229(65) on “promotion of technical co-operation and transfer of technology relating to the improvement of energy efficiency of ships“, Adopted on 17 May 2013.
6. IMO “Guidance on the Implementation of Model Courses” Volume 6 of Model course, IMO publication book, 1993.

Appendix 1 – The TTT Course Detailed Content

The IMO TTT Course Modules’ Main Content and Learning Objectives

Module title	Main content	Learning objectives: To enable the trainee to:
Module 1 - Climate Change and the Shipping Response	<ol style="list-style-type: none"> 1. Air emissions – a local and global concern <ul style="list-style-type: none"> • 1.1 Air emissions overview • 1.2 Origins of air emissions • 1.3 Air pollutants and humans • 1.4 Urbanisation and the concentration factors • 1.5 Industrialization and its impacts • 1.6 The need for transports • 1.7 Justification of action 2. Fossil fuels as main source of air emissions <ul style="list-style-type: none"> • 2.1 Fuels’ overall composition • 2.2 Evolution of combustion engines • 2.3 By-products of combustion • 2.4 Other non-combustion related air emissions 3. Climate system and global warming <ul style="list-style-type: none"> • 3.1 Overview • 3.2 Greenhouse Gas (GHG) emissions and climate change • 3.3 Main GHG emissions • 3.4 Climate change impacts on oceans 4. Combating air pollution: the role of international bodies <ul style="list-style-type: none"> • 4.1 Growth of concerns on air pollution • 4.2 Historical developments • 4.3 The United Nations Environment Programme (UNEP) • 4.4 Intergovernmental Panel on Climate Change (IPCC) • 4.5 The United Nations Framework Convention on Climate Change (UNFCCC) • 4.6 The Kyoto protocol 5. IMO Response: Maritime Environmental Regulatory Framework <ul style="list-style-type: none"> • 5.1 UNCLOS regulations and environment • 5.2 Overview of the IMO structure • 5.3 IMO commitment to environmental protection • 5.4 MARPOL Convention 	<ul style="list-style-type: none"> • Differentiate between the concept of air pollution and climate change. • Identify the origins and issues related to air pollution and climate change. • Describe the concept of climate change, its impacts and identify various types of GHG emissions. • Describe the international response to the problem, the global framework and main bodies / organisations involved in tackling climate change and their overall responsibilities. • Explain IMO’s structure and its general working practices with regard to environmental protection. • Identify the main IMO activities and studies; and describe the historical developments that led to the adoption of Chapter 4 of MARPOL Annex VI. • Explain the current IMO regulatory framework. • Describe the current debates on “further energy efficiency measures” and “technical cooperation and technology transfer” and progress so far. • Name typical IMO activities for promotion of ratification and implementation of MARPOL Annex VI and specifically those related to energy efficiency and GHG control.

	<ul style="list-style-type: none"> • 5.5 MARPOL Annex VI <p>6 IMO Response to control of GHG emissions from international shipping</p> <ul style="list-style-type: none"> • 6.1 Shipping GHG emissions context and IMO role • 6.2 First IMO GHG Study 2000 • 6.3 Second IMO GHG Study 2009 • 6.4 Third IMO study on GHG 2014 • 6.5 History of IMO GHG-related activities • 6.6 Current regulatory framework • 6.7 IMO Further energy efficiency measures • 6.8 Implementation and enforcement support 	
<p>Module 2 - Ship Energy Efficiency Regulations and Related Guidelines</p>	<p>Module Aims and Objectives</p> <ol style="list-style-type: none"> 1. Introduction <ul style="list-style-type: none"> • 1.1 Overview • 1.2 Changes to existing MARPOL Annex VI regulations 2. Chapter 4 of MARPOL Annex VI <ul style="list-style-type: none"> • 2.1 Overview • 2.2 Regulation 19 - Application • 2.3 Regulation 20 – Attained EEDI • 2.4 Regulation 21 – Required EEDI • 2.5 Regulation 22 - SEEMP • 2.6 Regulation 23 – Technical cooperation and technology transfer 3. EEDI calculation <ul style="list-style-type: none"> • 3.1 Concept of EEDI • 3.2 EEDI formula • 3.3 Terms in the EEDI formula • 3.4 EEDI Condition • 3.5 EEDI Technical File 4. EEDI Survey and Verification <ul style="list-style-type: none"> • 4.1 Overview • 4.2 Preliminary verification • 4.3 Final Verification • 4.4 Verification of the Attained EEDI for major conversions • 4.5 Verifier scope of activities • 4.6 SEEMP verification 	<ul style="list-style-type: none"> • Name and explain energy efficiency related MARPOL Annex VI regulations; • Describe the concept of Attained EEDI, Required EEDI, reference lines, and reduction factors and how they are related to each other. • Be able to calculate Attained EEDI and Required EEDI using ship data. • Describe the main aspects of EEDI survey and verification and relevant processes and organizations involved. • Describe the main features of a SEEMP according to relevant guidelines. • Be able to calculate EEOI using relevant data for a ship. • Identify related guidelines and why they have been developed and their usage.

	<ul style="list-style-type: none"> • 4.7 International Energy Efficiency (IEE) Certificate and its supplements • 4.8 Other related Guidelines <p>5. Ship Energy Efficiency Management Plan Development</p> <ul style="list-style-type: none"> • 5.1 SEEMP purposes • 5.2 SEEMP framework • 5.3 Planning • 5.4 Implementation • 5.5 Monitoring • 5.6 Self-evaluation and Improvement • 5.7 SEEMP format <p>6. Energy Efficiency Operational Indicator (EEOI)</p> <ul style="list-style-type: none"> • 6.1 Introduction • 6.2 Background and objectives • 6.3 Basic definitions • 6.4 Establishing the EEOI • 6.5 Further aspects 	
Module 3 - From Management to Operation	<p>1 Shipping Operations Overview</p> <ul style="list-style-type: none"> • 1.1 Introduction • 1.2 Shipping Company Structure • 1.3 Ship Types • 1.4 Cargo Types and Characteristics • 1.5 Ports • 1.6 Shipping Segments • 1.7 Ship/Fleet Planning • 1.8 Maintenance Management • 1.9 Bunker Procurement • 1.10 Environmental and Weather Routing • 1.11 Ship Loading <p>2 Shipping Contracts and Energy Efficiency</p> <ul style="list-style-type: none"> • 2.1 Introduction • 2.2 Industry Players • 2.3 Contract of Carriage • 2.4 Bill of Lading • 2.5 Charter Party 	<ul style="list-style-type: none"> • Be able to give an overview of how shipping industry works in terms of ship types, cargo types and shipping segments. • Explain the importance of management-level activities such as fleet planning, maintenance management and fuel procurement on overall energy efficiency and energy cost. • Explain various types of shipping contracts and how the contracts influences ship operation and energy efficiency. • Name and categorize the major ship and fleet operational management measures that impact the ships' fuel consumption. • Explain the concept of slow steaming, its impact on ship fuel use, technical issues that could result. • Describe the importance of ship loading and ship capacity utilisation for energy efficiency. • Discuss the issue of just in time operation,

	<ul style="list-style-type: none"> • 2.6 Shipping Contracts and Energy Efficiency <p>3 Fleet Optimisation and Slow Steaming</p> <ul style="list-style-type: none"> • 3.3 Slow Steaming • 3.4 References and Further Reading <p>4 Ship Loading and Cargo Management</p> <ul style="list-style-type: none"> • 4.1 Introduction • 4.2 Load Lines • 4.3 Ship Capacity Utilization • 4.4 Energy Efficient Technologies and Ship Capacity • 4.5 Loading Aspects, Trim and Ballasting • 4.6 Cargo Equipment Upgrade for Energy Efficiency • 4.7 Economies of Scale <p>5 Just In Time (JIT) and Virtual Arrival (VA)</p> <ul style="list-style-type: none"> • 5.1 Definitions • 5.2 Current Practices • 5.3 Just In Time (JIT) • 5.4 Virtual Arrival (VA) • 5.5 Potential for Energy Saving <p>6 E-Navigation and Weather Routing</p> <ul style="list-style-type: none"> • 6.1 What Is E-Navigation? • 6.2 E-Navigation Tools and GHG Emissions • 6.3 ECDIS (Electronic Chart Display and Information System) • 6.4 ECDIS Use for GHG Reduction • 6.5 Passage Planning • 6.6 Operation In Congested Routes • 6.7 Shallow Waters and Narrow Channels • 6.8 Weather Routing 	<p>concept of Virtual Arrival, use of ECDIS and electronic chart and weather routing and how all these could be utilised to save energy.</p> <ul style="list-style-type: none"> • Explain the above aspects, the way they impact ship energy efficiency, main barriers to their implementation and propose solutions and identify management and technical processes that could support the removal of the barriers. • Explain relative quantitative impacts of various measures on ship energy efficiency and cost of implementation.
<p>MODULE 4 - Ship-Board Energy Management</p>	<p>1 Introduction to Ship-Board Roles and Responsibilities</p> <ul style="list-style-type: none"> • 1.1 Introduction • 1.2 Ship-Board Organizational Structure • 1.3 Deck Department • 1.4 Engine Department • 1.5 Steward's Department • 1.6 Shipboard Activities for Energy Efficiency 	<ul style="list-style-type: none"> • Be familiar with typical ship-board organisational charts and role of various individuals and departments. • Be able to provide a list of the main ship-board energy efficiency measures (EEMs), their potential saving levels. • Explain what is trim, trim optimisation, its

	<ul style="list-style-type: none"> • 1.7 Importance of Communications Between Departments <p>2 Ship-Board Energy Efficiency Measures</p> <ul style="list-style-type: none"> • 2.1 Introduction • 2.2 Optimized Ship Handling • 2.3 Optimised Propulsion Condition • 2.4 Optimised Auxiliary Machinery • 2.5 Fuel Management • 2.6 Maintenance and Energy Efficiency • 2.7 Technical Upgrades and Retrofits • 2.8 Boilers and Steam System <p>3 Trim Optimisation</p> <ul style="list-style-type: none"> • 3.1 Introduction • 3.2 Economic Benefits • 3.3 Definitions • 3.4 Physics of Trim • 3.5 Operation Guidance • 3.6 Tools for Support • 3.7 Barriers to Trim Optimisation • 3.8 Frequently Asked Questions <p>4 Ballast Water Management (BWM) and Energy Efficiency</p> <ul style="list-style-type: none"> • 4.1 Introduction • 4.2 Port and Voyage Planning Aspects • 4.3 Typical Ballast Water Systems Without Treatment • 4.4 Ballast Water Management Plan (BWMP) • 4.5 Methods of Ballast Exchange • 4.6 Energy Efficiency Aspects <p>5 Hull and Propeller Condition</p> <ul style="list-style-type: none"> • 5.1 Ship Resistance and Hull Roughness • 5.2 Causes of Surface Roughness • 5.3 Hull Roughness Reduction • 5.4 Hull Coatings • 5.5 Hull Cleaning • 5.6 Propeller Roughness and Energy Efficiency • 5.7 Condition-Based Hull and Propeller Maintenance 	<p>energy saving impacts and best practice for finding out best trim.</p> <ul style="list-style-type: none"> • Be familiar with general aspects of ballast water exchange and management and its relevant EEMs • Explain the concept of hull and propeller roughness, fouling, level of impact on energy efficiency and options for monitoring. • Become familiar with ship engines, their efficiency characteristics and their condition and performance monitoring methods and systems. • Become familiar with steam system and boilers, relevant EEMs, and best practice for fuel saving. • Become familiar with fuel management aspects including storage, treatment and purification and the way they impact ship energy efficiency. • Appreciate the load factor and utilisation factor for engines and auxiliary machinery and the way they could be optimised for energy efficiency.
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	<p>6 Engines and Machinery Load and Utilisation Management</p> <ul style="list-style-type: none"> • 6.1 Introduction • 6.2 Engine Load Management • 6.3 Electrical Load Reduction • 6.4 Auxiliary Machinery Use Reduction Via System Planning • 6.5 Auxiliary Fluid Machinery • 6.6 Electric Motors <p>7 Fuel Management</p> <ul style="list-style-type: none"> • 7.1 Introduction • 7.2 Fuel Oil Procurement and Bunkering • 7.3 Fuel Quality and Quantity Assurance • 7.4 Fuel Storage and Transfer • 7.5 Bunker Measurements • 7.6 Fuel Consumption Measurement and Reporting • 7.7 Fuel Oil Treatment – Settling and Purification • 7.8 Fuel Viscosity Control • 7.9 Fuel Oil Additives • 7.10 Energy Efficiency Measures <p>8 Ship Maintenance and Energy Efficiency</p> <ul style="list-style-type: none"> • 8.1 Requirements, Rules & Regulations • 8.2 Maritime Maintenance Management • 8.3 Type of Maintenance • 8.4 Maintenance and Energy Efficiency <p>9 Technical Upgrade and Retrofit</p> <ul style="list-style-type: none"> • 9.1 Devices forward of Propeller • 9.2 Devices Aft of Propeller • 9.3 Ducted Propeller • 9.4 fore-Body Optimisation and Bulbous Bow • 9.5 Waste Heat Recovery • 9.6 Auxiliary Machinery and Systems <p>10 Boilers and Steam System</p> <ul style="list-style-type: none"> • 10.1 Introduction • 10.2 Overview of A Ship's Steam System • 10.3 Boiler Energy Efficiency Measures 	
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	<ul style="list-style-type: none"> • 10.4 Steam Distribution System Energy Efficiency Measures • 10.5 Steam End-Use Energy Efficiency Measures • 10.6 Shipboard Best Practice Guide 	
MODULE 5 – Ship-Port Interface and Energy Efficiency	<ol style="list-style-type: none"> 1 Introduction to Ports and Port-Area Emissions <ul style="list-style-type: none"> • 1.1 Port Role and Functions • 1.2 Complexity of Port Operation • 1.3 Ports and Air Emissions • 1.4 Method of Reduction of Port Area Emissions • 1.5 Port Non-Ship Related Emissions Reduction • 1.6 Port Ship-Related Emission Sources • 1.7 How to Deal With Ship-Port Interface 2 Ship Time In Port and Just In Time Operation <ul style="list-style-type: none"> • 2.1 Introduction • 2.2 Activities In Port Operations • 2.3 Impact of Ship’s Port Time On Efficient Ship Operation • 2.4 Just-In-Time Arrival/Departure and Improved Cargo Handling • 2.5 Port Operation Management • 2.6 Measures for Avoiding Ship’s Waiting Time In Port • 2.7 Implication of Just In Time 3 Technologies for Port Air Quality and GHG Emissions Reduction <ul style="list-style-type: none"> • 3.1 Introduction • 3.2 ICCT Study On Port Air Quality • 3.3 IMO Ship-Port Interface Study 4 Ship In-Port Operational Energy Efficiency Measures <ul style="list-style-type: none"> • 4.1 Introduction • 4.2 Operation of Auxiliary Machinery • 4.3 Use of Auxiliary Engines • 4.4 Operation of Boilers In Port • 4.5 Ship Operational Efficiency Measures 5 Onshore Power Supply (OPS) <ul style="list-style-type: none"> • 5.1 Introduction • 5.2 The Case for OPS • 5.3 Infrastructure Requirements • 5.4 Standardization 	<ul style="list-style-type: none"> • Explain the main activities of a port and the ports’ significance in maritime industry and operations. • Recognise the importance of “ship port time” in the context of energy efficient ship operation. • Describe the way that a ship’s just-in-time operation in a port may be realised. • Identify factors in port-side management that affect efficient ship operations. • Explain why onshore power (OPS) supply can reduce the ship’s port-related pollutions. • Discuss the requirements at port-side and ship-side for OPS and the barriers for its implementation. • Be able to analyse the impact of OPS on ship-at-berth air emissions and energy efficiency; • Become familiar with port-related green initiatives and port environmental programmes and how the ship is included in these initiatives. • Explain in general term, the Environmental Ship Index and how it works. • Be able to mention and give a brief explanation of other green port specific initiatives.

	<ul style="list-style-type: none"> • 5.5 Port Related Initiatives • 5.6 IMO Regulations • 5.7 OPS Effectiveness • 5.8 OPS and Energy Efficiency <p>6 Green Port Initiatives and Port Environmental Programs</p> <ul style="list-style-type: none"> • 6.1 Introduction • 6.2 Port Related VOC Management • 6.3 Differentiated Port Dues • 6.4 Differentiated Ship Registration Fees • 6.5 Environmental Ship Index (ESI) • 6.6 Port Clean Air Program • 6.7 Norway NOx Tax and NOx Fund • 6.8 General Discussion 	
MODULE 6 – Energy Management Plans and Systems	<p>1 Overview of Management Systems</p> <ul style="list-style-type: none"> • 1.1 Introduction • 1.2 ISM Code • 1.3 Standards other than ISM • 1.4 Commonalities Between Management Standards • 1.5 Certification and Other Aspects <p>2 ISO 50001 Energy Management System</p> <ul style="list-style-type: none"> • 2.1 Overview • 2.2 Target Setting and Performance Criteria • 2.3 Scope of EnMS • 2.4 Certification • 2.5 Responsibilities • 2.6 Energy Policy • 2.7 Planning • 2.8 Monitoring • 2.9 Management Review <p>3 Shipping Company Energy Management</p> <ul style="list-style-type: none"> • 3.1 Overview • 3.2 Ship-Level Energy Management Plan (SEEMP) • 3.3 Company-Level Energy Management System • 3.4 Summary Main Features of Company Energy Management System 	<ul style="list-style-type: none"> • Be able to describe broad aspects of management systems and their main features including the continuous improvement cycle including plan-do-check-act aspects. • Become familiar with general aspects of ISM code and ISO 140001 as typical shipping management systems. • Explain main features of energy management systems based on ISO 50001 approaches. • Explain what is shipping company energy management systems (CEnMS), its differentiation with IMO SEEMP, and main features such as energy policy, energy review and so on. • Explain the main purpose of IMO data collection system, its status and experience together with the status and characteristics of the EU MRV system. • List techniques and processes for conducting a ship energy audit or review for energy planning as well as energy performance monitoring. • Be able to describe main aspects of ship

	<p>4 Energy Audit and Review</p> <ul style="list-style-type: none"> • 4.1 Introduction • 4.2 Types of Energy Audit • 4.3 Ship Energy Audit Process • 4.4 Typical Data Analysis • 4.5 Techno Economic Analysis <p>5 Ship Performance Monitoring and Reporting</p> <ul style="list-style-type: none"> • 5.1 Introduction • 5.2 Benefits of Ship Performance Monitoring • 5.3 Performance Monitoring System Design • 5.4 Types of Performance Monitoring Systems • 5.5 Hull Performance Monitoring • 5.6 Engine Performance Monitoring • 5.7 Auxiliary Machinery Monitoring • 5.8 Voyage Performance Analysis • 5.9 Monitoring and Reporting to External Bodies 	<p>performance monitoring and its application techniques for hull, engines and voyage performance evaluation.</p>
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Appendix 2 - IMO TTT Course Programme Including Pedagogic (5 Days)

	DAY 1	DAY 2	DAY 3	DAY 4	DAY 5	
Morning period 1 (1.5 hours)	<p>Opening:</p> <ul style="list-style-type: none"> Registration Opening remarks and ceremony Introduction to course content and plan for the week Participants self-introduction <p>Module 1 – Part 1: Climate Change and the Shipping Response</p> <ul style="list-style-type: none"> Air emissions overview, pollutants, GHG emissions, their sources and origins and role of fossil fuels. Climate change, GHG emissions, IPCC assessment reports, need for action. 	<p>Module 2 - part 2: Ship Energy Efficiency Regulations and Related Guidelines</p> <ul style="list-style-type: none"> EEDI survey and verification and guidelines SEEMP development, implementation and monitoring and relevant guidelines EEOI calculation method and relevant guidelines. A discussion of debate on further technical and operational measures and other relevant activities. 	<p>Module 4 part 1– Ship-Board Energy Management</p> <ul style="list-style-type: none"> Introduction to ship-board roles and responsibilities Shipboard activities and energy efficiency Importance of good communication between engine and deck departments Ship board energy efficiency measures. Trim optimisation Ballast water optimisation. Ship maintenance and energy efficiency. 	<p>Module 5 - part 2: Ship-Port Interface and Energy Efficiency</p> <ul style="list-style-type: none"> Technologies for port air quality and GHG emissions reduction Ship-board measure for in-port operational energy efficiency. Onshore power supply (OPS), case for energy efficiency, requirements, standardisation, ports with OPS. Green port initiatives and port environmental programs, VOC controls, environmental ship index, port environmental program, other initiatives. 	<p>1 hour group (G) presentation plus 20 min Q/A</p> <p>G3 Presentation assessed by G2</p> <p>Purpose: assess presentation skills in context</p> <p>Instructors present:</p> <ul style="list-style-type: none"> Name 1 Name 2 	<p>1 hour group (G) presentation plus 20 min Q/A</p> <p>G1 Presentation assessed by G4</p> <p>Purpose: assess presentation skills in context</p> <p>Instructors present:</p> <ul style="list-style-type: none"> Name 3 Name 4
Morning period 2 (1.5 hours)	<p>Module 1 – Part 2: Climate Change and the Shipping Response</p> <ul style="list-style-type: none"> Role of international bodies in combating air emissions including UNEP, IPCC and UNFCCC. IMO response to concerns on air emissions and MARPOL Annex VI IMO GHG Studies, IMO regulatory framework, IMO debate on further energy efficiency measures, implementation and enforcement aspects. 	<p>Module 3 - part 1: From Management to Operation</p> <ul style="list-style-type: none"> Overview of shipping operations including operation segments, ship types, cargo types, ports roles, etc. Shipping contracts and energy efficiency, contract of carriage, bill of lading and charter party Ship loading and cargo management, load lines, ship capacity utilization, loading aspects in relation to trim and ballasting, economies of scale. 	<p>Module 4 part 2– Ship-Board Energy Management</p> <ul style="list-style-type: none"> Hull and propeller conditions and energy saving potential. Engine performance and condition monitoring. Boiler and steam system Fuel management, fuel consumption measurement techniques, fuel treatment and relevant EEMs. Technical upgrades and retrofits including hull, propeller, engines and auxiliary machinery. 	<p>Module 6 - part 1: Energy Management Plans and Systems</p> <ul style="list-style-type: none"> Overview of various ship-board management systems such as ISM, ISO 14001 and ISO 50001 and their commonalities. ISO 50001 on energy management system, requirements, target setting, performance indicators, energy planning, energy policy, certification and management reviews. 	<p>1 hour group (G) presentation plus 20 min Q/A</p> <p>G2 Presentation assessed by G1</p> <p>Instructors present:</p> <ul style="list-style-type: none"> Name 3 Name 4 	<p>1 hour group (G) presentation plus 20 min Q/A</p> <p>G4 Presentation assessed by G3</p> <p>Instructors present:</p> <ul style="list-style-type: none"> Name 1 Name 2
Lunch Break						

<p>Afternoon Period 1 (1.5 hours)</p>	<p>Module 2 - part 1: Ship Energy Efficiency Regulations and Related Guidelines</p> <ul style="list-style-type: none"> • Overview of MARPOL Annex VI regulations and changes to them for inclusion of energy efficiency. • Regulatory framework for energy efficiency for ships including details of regulation 19 to 23 of MARPOL Annex VI on EEDI, SEEMP and technical cooperation. • EEDI calculation method and guidelines. • Use of EEDI calculator. 	<p>Module 3 - part 2: From Management to Operation</p> <ul style="list-style-type: none"> • Slow steaming • Just in time operation • Virtual arrival • Weather routing, weather impacts. • ECDIS and digital navigation systems and impact on energy efficiency 	<p>Module 5 – Part 1: Ship-Port Interface and Energy Efficiency</p> <ul style="list-style-type: none"> • Introduction to ports and port management • Ports and air emissions • Ship related and non-ship related port emissions • Ship’s time in port and just in time operation, the problem, energy saving potentials, barriers and techniques for achieving just in time. 	<p>Module 6 - Part 2: Energy Management Plans and Systems</p> <ul style="list-style-type: none"> • Company level energy management, ship-level energy management plan (SEEMP). • Energy audit and review, types, processes, typical data analysis and methods for techno economic analysis • Ship performance monitoring, benefits, types of systems, hull and engines performance and condition monitoring, voyage performance analysis • Monitoring and reporting to external bodies including IMO data collection and EU MRV. 	<p>Feedback collective and comments</p> <ul style="list-style-type: none"> • Collective feedback (oral) • Individual feedback, written on request • Course evaluation forms • Trainees final comments
<p>Afternoon Period 2 (1.5 hours)</p>	<p>Teaching Aspects 1</p> <ul style="list-style-type: none"> • General presentation on learning outcomes relating to pedagogic aspects • Learning styles • Factors affecting learning • Active learning processes 	<p>Teaching Aspects 2</p> <ul style="list-style-type: none"> • Select groups and introduce assignments: Prepare a 1 hr presentation covering the essence of the topics (6 modules) • Introduction to Trainers’ Manual 	<p>Teaching Aspects 3</p> <ul style="list-style-type: none"> • Course development • Lesson plan and training objectives • The role of presenter, trainer and facilitator. 	<p>Teaching Aspects 4</p> <ul style="list-style-type: none"> • Characteristics of effective trainers • Presentation skill and presentation delivery aspects. <p>Group 1/2/3/4 Preparations: The pedagogic expert will support the trainees with their preparations.</p>	<p>Close of the Training /Workshop</p> <ul style="list-style-type: none"> • Final sum up by Course Director • Next steps for trainers • Closing ceremony

Appendix 3 - Training Programme for Technical Content (3 Days)

	DAY 1	DAY 2	DAY 3
Morning period 1 (1.5 hours)	<p>Opening:</p> <ul style="list-style-type: none"> Registration Opening remarks and ceremony Introduction to course content and training plan Participants self-introduction <p>Module 1 – Part 1: Climate Change and the Shipping Response</p> <ul style="list-style-type: none"> Air emissions overview, pollutants, GHG emissions, sources and origins and role of fossil fuels. Climate change, GHG emissions, IPCC assessment reports, need for action. 	<p>Module 3 - part 1: From Management to Operation</p> <ul style="list-style-type: none"> Overview of shipping operations including operation segments, ship types, cargo types, ports roles, etc. Shipping contracts and energy efficiency, contract of carriage, bill of lading and charter party Ship loading and cargo management, load lines, ship capacity utilization, loading aspects in relation to trim and ballasting, economies of scale.. 	<p>Module 5 – Part 1: Ship-Port Interface and Energy Efficiency</p> <ul style="list-style-type: none"> Introduction to ports and port management Ports and air emissions Ship related and non-ship related port emissions Ship’s time in port and just in time operation, the problem, energy saving potentials, barriers and techniques for achieving just in time.
Morning period 2 (1.5 hours)	<p>Module 1 – Part 2: Climate Change and the Shipping Response</p> <ul style="list-style-type: none"> Role of international bodies in combating air emissions including UNEP, IPCC and UNFCCC. IMO response to concerns on air emissions and MARPOL Annex VI IMO GHG Studies, IMO regulatory framework, IMO debate on further energy efficiency measures, implementation and enforcement aspects. 	<p>Module 3 - part 2: From Management to Operation</p> <ul style="list-style-type: none"> Slow steaming Just in time operation Virtual arrival Weather routing, weather impacts. ECDIS and digital navigation systems and impact on energy efficiency. 	<p>Module 5 - part 2: Ship-Port Interface and Energy Efficiency</p> <ul style="list-style-type: none"> Technologies for port air quality and GHG emissions reduction Ship-board measure for in-port operational energy efficiency. Onshore power supply (OPS), case for energy efficiency, requirements, standardisation, ports with OPS. Green port initiatives and port environmental programs, VOC controls, environmental ship index, port environmental program, other initiatives.
Lunch Break			

<p>Afternoon Period 1 (1.5 hours)</p>	<p>Module 2 - part 1: Ship Energy Efficiency Regulations and Related Guidelines</p> <ul style="list-style-type: none"> • Overview of MARPOL Annex VI regulations and changes to them for inclusion of energy efficiency. • Energy efficiency regulatory framework including details of regulation 19 to 23 of MARPOL Annex VI on EEDI, SEEMP and technical cooperation. • EEDI calculation method and guidelines. • Use of EEDI calculator. 	<p>Module 4 part 1– Ship-Board Energy Management</p> <ul style="list-style-type: none"> • Introduction to ship-board roles and responsibilities • Shipboard activities and energy efficiency • Importance of good communication between engine and deck departments • Ship board energy efficiency measures. • Trim optimisation • Ballast water optimisation. • Ship maintenance and energy efficiency 	<p>Module 6 - part 1: Energy Management Plans and Systems</p> <ul style="list-style-type: none"> • Overview of various ship-board management systems such as ISM, ISO 14001 and ISO 50001 and their commonalities. • ISO 50001 on energy management system, requirements, target setting, performance indicators, energy planning, energy policy, certification and management reviews.
<p>Afternoon Period 2 (1.5 hours)</p>	<p>Module 2 - part 2: Ship Energy Efficiency Regulations and Related Guidelines</p> <ul style="list-style-type: none"> • EEDI survey and verification and guidelines • SEEMP development, implementation and monitoring and relevant guidelines • EEOI calculation method and relevant guidelines. • A discussion of debate on further technical and operational measures and other relevant activities. 	<p>Module 4 part 2– Ship-Board Energy Management</p> <ul style="list-style-type: none"> • Hull and propeller conditions and energy saving potential. • Engine performance and condition monitoring. • Boiler and steam system • Fuel management, fuel consumption measurement techniques, fuel treatment and relevant EEMs. • Technical upgrades and retrofits including hull, propeller, engines and auxiliary machinery. 	<p>Module 6 - Part 2: Energy Management Plans and Systems</p> <ul style="list-style-type: none"> • Company level energy management, ship-level energy management plan (SEEMP). • Energy audit and review, types, processes, typical data analysis and methods for techno economic analysis • Ship performance monitoring, benefits, types of systems, hull and engines performance and condition monitoring, voyage performance analysis • Monitoring and reporting to external bodies including IMO data collection and EU MRV.

Appendix 4 – Title of Sample Course Exercises

MODULE 1 EXERCISES

- EXERCISE 1.1 – SHIPPING AIR EMISSIONS AND THEIR IMPACTS
- EXERCISE 1.2 – GLOBAL RESPONSE TO CLIMATE CHANGE CONTROL
- EXERCISE 1.3 – INTERNATIONAL SHIPPING RESPONSE TO CLIMATE CHANGE CONTROL
- EXERCISE 1.4 – ROLE AND RESPONSIBILITIES AT GLOBAL LEVELS

MODULE 2 EXERCISES

- EXERCISE 2.1 – MAIN ABBREVIATIONS/ACRONYMS IN SHIP ENERGY EFFICIENCY
- EXERCISE 2.2 – REGULATORY REQUIREMENTS
- EXERCISE 2.3 – TEST ON EEDI CALCULATION GUIDELINES
- EXERCISE 2.4 – EEOI CALCULATIONS
- EXERCISE 2.5 – EEDI CALCULATIONS USING THE CALCULATOR
- EXERCISE 2.6 – EEDI VERIFICATION

MODULE 3 EXERCISES

- EXERCISE 3.1 – LEGAL FRAMEWORKS AND THEIR IMPACT ON ENERGY EFFICIENCY ACTIVITIES
- EXERCISE 3.2 – SLOW STEAMING STRATEGIC DECISION MAKING
- EXERCISE 3.3 – SLOW STEAMING TECHNICAL DECISION MAKING
- EXERCISE 3.4 – ESTIMATION OF THE IMPACT OF A MORE JUST IN TIME OPERATION ON SHIP FUEL CONSUMPTION
- EXERCISE 3.5 – SHIP TRIM, NORMAL PRACTICES AND OPTIMISATION
- EXERCISE 3.6 – ENERGY EFFICIENCY MEASURES
- EXERCISE 3.7 – MAIN FACTORS THAT INFLUENCE A SHIP'S FUEL CONSUMPTION

MODULE 4 EXERCISES

- EXERCISE 4.1 – ESTIMATION OF SAVING: CASE FOR AUXILIARY ENGINES OPERATION MANAGEMENT
- EXERCISE 4.2 – SHIP BOARD ENERGY EFFICIENCY MEASURES
- EXERCISE 4.3 – AUXILIARY MACHINERY ENERGY EFFICIENCY MEASURES
- EXERCISE 4.4 – SHIP ENERGY REVIEW
- EXERCISE 4.5 – FUEL MANAGEMENT RELATED “ENERGY EFFICIENCY MEASURES”
- EXERCISE 4.6 – EEOI AND ITS VARIATIONS

MODULE 5 EXERCISES

- EXERCISE 5.1 – SHIP'S “PORT TIME” AND ITS IMPACT
- EXERCISE 5.2 – MAJOR PLAYERS IN A PORT
- EXERCISE 5.3 – PORT ENVIRONMENTAL PROGRAMME OR PORT GREEN INITIATIVE
- EXERCISE 5.4 – ONSHORE POWER SUPPLY (OPS)

MODULE 6 EXERCISES

- EXERCISE 6.1 – ENERGY POLICY
- EXERCISE 6.2 – DATA COLLECTION AND REPORTING
- EXERCISE 6.3 – DEVELOPMENT OF A SHIP ENERGY MANAGEMENT PLAN
- EXERCISE 6.4 – DEVELOPMENT OF A SHIPPING COMPANY ENERGY MANAGEMENT SYSTEM
- EXERCISE 6.5 – DRIVERS FOR SHIPPING ENERGY EFFICIENCY
- EXERCISE 6.6 – HOW WILL YOU CONDUCT A SHIP ENERGY AUDIT / REVIEW?
- EXERCISE 6.7 – DEVELOP A FRAMEWORK FOR A PERFORMANCE MONITORING SYSTEM

For full text of the TTT course exercises, refer to a separate document.

Appendix 5 – Sample IMO Training / Capacity Building Feedback Form

Note – This feedback form is used to evaluate the capacity building training via collecting feedback from participants. This is subject to change by IMO; however this form or a similar one may be used for receiving feedback from trainees/participants.

EVALUATION QUESTIONNAIRE

Seminar/Workshop/Symposium/Course on

Title/venue and date:

Arrangements prior to the activity

- | | | | | |
|---|----------------------------------------------------------------------------------------|------------------------------|-----------------------------|------------------------------|
| 1 | Was the invitation received in good time? | Yes <input type="checkbox"/> | No <input type="checkbox"/> | |
| 2 | Did you receive the information listed below about the event before your participation | | | |
| | • on its objective and scope | Yes <input type="checkbox"/> | No <input type="checkbox"/> | |
| | • subject areas and programme | Yes <input type="checkbox"/> | No <input type="checkbox"/> | |
| 3 | Were the instructions on the following clear and easy to understand? | | | |
| | • profile required of participant | Yes <input type="checkbox"/> | No <input type="checkbox"/> | |
| | • completion and submission of the nomination form | Yes <input type="checkbox"/> | No <input type="checkbox"/> | |
| 4 | Did you receive logistical information on | | | |
| | • venue | Yes <input type="checkbox"/> | No <input type="checkbox"/> | |
| | • travel arrangements | Yes <input type="checkbox"/> | No <input type="checkbox"/> | N/A <input type="checkbox"/> |
| | • DSA payments | Yes <input type="checkbox"/> | No <input type="checkbox"/> | N/A <input type="checkbox"/> |
| | • accommodation | Yes <input type="checkbox"/> | No <input type="checkbox"/> | N/A <input type="checkbox"/> |
| 5 | If you were given any pre-event assignment, was it useful? | Yes <input type="checkbox"/> | No <input type="checkbox"/> | N/A <input type="checkbox"/> |

During the activity

- | | | | | | |
|---|--------------------------------------------------------------------------------------------|-----------------------------------------|----------------------------------------|--------------------------|--------------------------|
| 6 | To cover the topics fully, was the event <i>(please check the appropriate box)</i> | | | | |
| | (1) too long <input type="checkbox"/> | (2) just right <input type="checkbox"/> | (3) too short <input type="checkbox"/> | | |
| 7 | How do you rate the event with regard to the following? <i>(tick one box in each case)</i> | | | | |
| | | excellent | good | satisfactory | poor |
| | Venue | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| | Facilities | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| | Equipment | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 8 | How do you rate the following aspects of the materials? <i>(tick one box in each case)</i> | | | | |
| | | excellent | good | satisfactory | poor |
| | Presentation | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| | Clarity | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| | Technical content | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| | Comprehensiveness | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| | Quantity | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

9 How would you rate the following aspects of the presentations? *(tick one box in each case)*

	excellent	good	satisfactory	poor
Design and structure	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Clarity	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Technical contents	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Comprehensiveness	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

10 How would you rate the use of the following? *(tick one box in each case)*

	excellent	good	satisfactory	poor	
Course materials	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
IMO reference materials	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Other resource materials	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Group and practical activities	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	N/A <input type="checkbox"/>
Field trips	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	N/A <input type="checkbox"/>

At the end of the activity

11 Please rate each lecturer with regard to the following *(check one box in each case)*

Name of lecturer (to be inserted)	excellent	good	satisfactory	poor
.1 _____				
content of lecture	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
delivery of presentation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
ability to transfer knowledge	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
effectiveness in:				
• answering questions	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
• suggesting solutions to issues	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Name of lecturer (to be inserted)	excellent	good	satisfactory	poor
.2 _____				
content of lecture	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
delivery of presentation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
ability to transfer knowledge	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
effectiveness in:				
• answering questions	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
• suggesting solutions to issues	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Name of lecturer (to be inserted)	excellent	good	satisfactory	poor
--------------------------------------	-----------	------	--------------	------

.3 _____

content of lecture	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
delivery of presentation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
ability to transfer knowledge	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
effectiveness in:				
• answering questions	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
• suggesting solutions to issues	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

(Please use additional sheets if the number of lecturers exceeds 3).

12 What topics were of most interest and relevance to you?

13 Are there any topics which should be added? Yes No
If yes, please list them:

14 Do you consider that the objective of the event was met? Yes No

15 Are you likely to use the information you gained on the course when you return to work? Yes No

16 Will you have the opportunity to transfer the knowledge gained to your colleagues at work? Yes No

Comments:

We greatly appreciate your time in completing this evaluation questionnaire. It contains important information that will assist IMO in determining the success and impact of the activity. Thank you.