MODEL
COURSE

X.XX

Model Course for Ratings as Able Seafarer Deck (A-II/5)

20XX Edition

INTERNATIONAL
MARITIME
ORGANIZATION

ACKNOWLEDGEMENTS

IMO wishes to express its sincere appreciation to the Governments of China, Germany, Singapore and United Kingdom for their provision of expert assistance, and excellent cooperation to support the development of this model course.

Contents

Introduction

- **Purpose of the model courses**

The purpose of IMO model courses is to assist maritime training institutes and their teaching staff in organizing and introducing new training courses or in enhancing, updating or supplementing existing training programmes whereby the quality and effectiveness of the training courses may be improved.

It is not the intention of the model course programme to present instructors with a rigid "teaching package" which they are expected to "follow blindly". Nor is it the intention to substitute audio-visual or "programmed" material for the instructors to pre-set. As in all training endeavours, the knowledge, skills, competence and dedication of the instructors are the key components in the transfer of knowledge and skills to those being trained through utilization of IMO model courses.

Rather, this document should be used as a guide, with the course duration given as indicative of the expected time required to cover the required outcomes. Parties may modify this course to suit their respective training programmes.

For those following planned training programmes approved by the administration, it is intended that this training may form an integral part of the overall training plan and be complementary to other studies. The training may be undertaken in progressive stages and for such candidates, it is not appropriate to specify the duration of the learning, provided achievement of the specified learning outcomes is properly assessed and recorded.

The educational systems and the cultural backgrounds of trainees in maritime training vary considerably from country to country. For this reason the model course material has been designed to identify the basic entry requirements and trainee target group for each course in universally applicable terms, and to specify clearly the technical content and levels of knowledge and skill necessary to meet the technical intent of IMO conventions and related recommendations.

In order to keep the training programme up to date in future, it is essential that users provide feedback. New information will provide better training in safety and security at sea and protection of the marine environment. Information, comments and suggestions should be sent to the Head, Maritime Training and Human Element, IMO.

- **Use of the model course**

The instructor should review the course plan and detailed syllabus, taking into account the information provided under the entry standards specified in the course framework. The actual level of knowledge and skills, experience and the prior technical education of the trainees should be kept in mind during this review, and any areas within the detailed syllabus which may cause difficulties, because of differences between the actual trainee entry level and that assumed by the course developer, should be identified. To compensate for such differences, the instructor is expected to delete from the course, or reduce the emphasis on, items dealing with knowledge or skills assessed as being already attained by the trainees. The

instructor should also identify any knowledge, skills or technical training which the trainees may not have acquired.

Adjustment of the course objective, scope and content may also be necessary if the trainees completing the course are to undertake duties which differ from the course objectives specified in the model course.

Within the course plan the course developers have indicated their assessment of the time which should be allotted to each area of learning. However, it must be appreciated that these allocations are arbitrary and assume that the trainees have fully met all entry requirements of the course. The instructor should, therefore, review these assessments carefully, and may need to re-allocate the time required to achieve each specific learning objective or training outcome.

- **Aims**

This model course aims to meet the mandatory minimum requirements for the knowledge, understanding and proficiency in Table A-II/5 of STCW Code at the Support Level, for:

Function 1: Navigation at the Support Level

Function 2: Cargo Handling and Stowage

Function 3: Controlling the Operation of the Ship and Care for Persons on Board

Function 4: Maintenance and Repair

- **Lesson plans**

Having adjusted the course content to suit the trainee intake and any revision of the course objectives, the instructor should draw up lesson plans based on the detailed syllabus. The detailed syllabus contains specific references to the textbooks or teaching material proposed to be used in the course. Where no adjustment is found necessary in the learning objectives of the detailed syllabus, the lesson plans may consist of the detailed syllabus with keywords or other reminders added to assist the instructor in presenting the material.

- **Presentation**

The presentation of concepts and methodologies must be repeated in various ways until the instructor is satisfied, by testing and evaluating the trainee's performance and achievements, that the trainee has attained each specific learning objective or training outcome. The syllabus is laid out in learning objective format and each objective specifies a required performance or, what the trainee must be able to do as the learning or training outcome. Taken as a whole, these objectives aim to meet the knowledge, understanding and proficiency specified in table A-II/5 of the STCW Code.

- **Implementation**

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

- Properly qualified instructors;
- Support staff;
- Class rooms and other learning spaces;
- Simulators and other relevant equipment;
- Suggested references, textbooks, technical papers; and
- Other applicable reference materials.

Thorough preparation is the key to successful implementation of the course. IMO "Guidance on the implementation of IMO model courses", deals with this aspect in greater detail.

In certain cases, the requirements for some or all of the training in a subject may be covered by another lMO model course. In these cases, the specific part of the STCW Code which applies is given and the user is referred to the other model course.

- **Course objective**

This model course comprises four functions at the support level. On successful completion of the training and assessment trainees should be competent to carry out safely the duties of ratings as able seafarer deck.

The teaching schemes should be carefully scrutinized to ensure that all of the tabulated training outcomes in the STCW Code and the essential underpinning knowledge at each stage are effectively covered. A certain amount of duplication under different subjects will probably occur. Provided it is not excessive, the different approaches can provide useful reinforcement of subjects already learned. Care should be taken to see that items not included in the syllabus or treatment beyond the depth indicated by the objectives have not been introduced, except where necessary to meet additional requirements of the Administration.

- **Entry standards**

The minimum educational standards for entry to the profession may be prescribed by the Administration. In preparing this course it has been assumed that entrants will have successfully completed a minimum period of full-time general education of about 9 to 10 years up to secondary level. They should have reached a standard in mathematics, physical science and English language which would enable them to undertake the learning as set out in the syllabuses for those subjects.

Where entrants have not reached the required standard in mathematics, physical science and English language, it will be necessary to provide a preparatory course or courses to bring them to the desired level before starting the course.

The IMO Model Course 3.17 Maritime English provides guidance to assist administrations in developing their own training programmes to achieve the

standards of competency in Maritime English and effective communication, set out in the STCW Code. Noting the wide range of seafarers working in different capacities on board ships, the relevant sections from Model Course 3.17 may be selected to suit the seafarers' individual needs as per their related duties on board.

Conversely, topics which have been adequately covered during their general education can be omitted and the allotted time reduced accordingly.

Those entering the course shall meet the requirements of Chapter II, Section A-II/4 of the STCW Code for ratings forming part of a navigational watch.

They should have completed an approved training programme and have approved seagoing service in the deck department of not less than 12 months or 18 months approved seagoing service in the deck department, for certification as Able Seafarer Deck.

- **Class intake limitations**

Class sizes should be limited to not more than 24 in order to allow the instructor to give adequate attention to individual trainees. Larger manageable numbers may be admitted if extra staff and tutorial time can be provided to deal with individual needs of trainees. In addition, for scheduling access to learning facilities and equipment, attention to strict time management is necessary. Trainees should have their own reference books, unless sufficient copies can be provided in a central library. During theoretical lessons, practical sessions and group activities, classrooms and practical training spaces, where necessary, shall be sufficient to accommodate all trainees to facilitate effective course delivery by the instructors. Where applicable, a recommendation on class size is contained in the frameworks for each of the individual functions.

- **Textbooks and bibliography**

References to books and bibliography are made in the syllabuses of the individual subjects to aid both instructors and trainees in finding relevant information and to help in defining the scope and depth of treatment intended.

The mention of a particular textbook does not imply that it is either essential to use that book, or that it has been approved by IMO. It may have appeared to be best suited to the course at the time of its design. In many instances there maybe a number of suitable books and instructors are free to use whatever texts they consider to be most suited to their circumstances and trainees.

Every effort has been made to quote the latest editions of the publications mentioned but Instructors should always endeavour to use the latest edition for preparing and running their courses.

Full use should be made of IMO documents, technical papers and other publications available from maritime and other professional organizations. Such documents contain new developments in techniques, equipment, design, management and opinion and are an invaluable asset to a maritime training establishment.

The instructors must ensure that the latest editions are available and used.

- **Computer applications**

In view of the widespread use of computers aboard ships, it is recommended that an element of computer applications be included in the training of ratings as able seafarer deck.

The use of multi-media applications can enhance learning in topics such as COLREGS, signalling and other areas of knowledge. Many of the IMO rules and Assembly Resolutions are available on CD-ROM. Up to date details may be found on the IMO web site at http://www.imo.org.

Instructors should bear in mind that the internet can be a valuable source of information and teaching aids.

- **Training and the STCW Convention**

The minimum standards of competence that have to be met by seafarers are defined in Part A of the STCW Code of the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers 1978, as amended. This model course provides guidance to achieve the standards of competence for the functions specified in Table A-II/5 of the STCW-Code.

The course is organized under the four functions at support level to cover the minimum standard of competence of ratings as able seafarer deck on ships of 500 gross tonnage or more, (see STCW Code Table A-II/5).

For ease of reference, the course material is organised in four separate Functions as per Table A-II/5 of the STCW Code. These functions at the support level are:

Function 1 Navigation;

Function 2 Cargo handling and stowage;

Function 3 Controlling the operation of the ship and care for persons on board;

Function 4 Maintenance and repair.

Each function is addressed in 5 parts: Part A which is common for all functions, Part B, Part C, Part D and Part E, which again addresses all the functions.

Part A provides the framework for the course with its aims and objectives and notes on the suggested teaching facilities and equipment. A list of useful teaching aids which includes IMO references and textbooks is included in function 1, which affects all the 4 functions.

Part B provides an outline of lectures, demonstrations and exercises for the course. No detailed timetable is suggested. From the teaching and learning point of view, it is more important that the trainee achieves the minimum standard of competence defined in the STCW Code than that a strict timetable is followed. Depending on their experience and ability, some trainees will naturally take longer to become proficient in some topics than in others.

Part C provides the Detailed Teaching Syllabus. This is based on the combined, theoretical and practical knowledge specified in the STCW Code. It is written as a series of learning objectives, in other words what the trainee is expected to be able to

do as a result of the teaching and training. Each of the objectives is expanded to define a required performance of knowledge, understanding and proficiency. Suggested teaching aids including IMO references, textbook references and bibliography are integrated to assist the teacher in designing lessons.

Part D provides the Instructor Manual, which contains guidance notes for the Instructor and additional explanations. There are also new annexes accompanying Part D of Function 1, which provide the Instructor with a Sample Scheme of work, a Sample lesson plan, a Sample trainee's hand-out and a Sample presentation. These entire Instructors' aids are provided for reference only.

Part E provides guidance on Evaluation which addresses all the functions. A separate IMO Model course 3.12 also addresses Assessment of Competence. This course explains the use of various methods for demonstrating competence and criteria for evaluating competence as tabulated in the STCW Code.

The Convention defines the minimum standards to be attained in Part A of the STCW Code. Mandatory provisions concerning Training and Assessment are given in Section A-I/6 of the STCW Code. These provisions cover: qualification of instructors; supervisors as assessors; in-service training; assessment of competence; and training and assessment within an institution. The corresponding Part B of the STCW Code contains guidance on training and assessment.

The criteria for evaluating competence specified in the minimum standard of competence tables of Part A of the STCW Code are to be used in the assessment of all competences listed in those tables.

- **Validation**

The guidance contained in this document has been validated by the Sub-Committee on Human Element, Training and Watchkeeping for use by Administrations and training providers for the training of ratings to facilitate uniform implementation of the minimum standards in the STCW Code. Validation in this context means that the Sub-Committee has found no grounds to object to the contents of this model course, but has not granted approval to the document, as the Sub-Committee does not consider any model course to be an official interpretation of IMO Instruments.

Part A: Course Framework for all Functions

■ Objectives

Function 1: Navigation at the Support Level

This syllabus covers the requirements of the STCW Code, Section A-II/5. This functional element provides the detailed knowledge to support the training outcomes related to Navigation at the Support Level.

This section provides the background knowledge to support the competencies:

- Contribute to a safe navigational watch; and
- Contribute to berthing, anchoring and other mooring operations.

Function 2: Cargo Handling and Stowage at the Support Level

This syllabus covers the requirements of the STCW Code, Section A-II/5. This functional element provides the detailed knowledge to support the training outcomes related to Cargo Handling and Stowage at the Support Level.

This section provides the background knowledge to support:

- Contribute to the handling of cargo and stores

Function 3: Controlling the Operation of the Ship and Care for Persons on Board at the Support Level

This syllabus covers the requirements of the STCW Code, Section A-II/5. This functional element provides the detailed knowledge to support the training outcomes related to Controlling the Operation of the Ship and Care for Persons on Board at the Support Level.

This section provides the background knowledge to support:

- Contribute to the safe operation of deck equipment and machinery
- Apply occupational health and safety precautions
- Apply precautions and contribute to the prevention of pollution of the marine environment *
- Operate survival craft and rescue boats *

* These topics are covered by the following IMO model courses

1.38 Marine Environmental Awareness

1.23 Proficiency in Survival Craft and Rescue Boats (other than Fast Rescue Boats)

Function 4: Maintenance and Repair at the Support Level

This syllabus covers the requirements of the STCW Code, Section A-II/5. This functional element provides the detailed knowledge to support the training outcomes related to Maintenance and Repair at the Support Level.

This section provides the background knowledge to support:

– Contribute to shipboard maintenance and repair

- **Course certificate**

On successful completion of the course and assessments, a document may be issued certifying that the holder has successfully completed a course of training which meets the level of knowledge and competence specified in table A-II/5 of STCW Code.

A certificate of proficiency may be issued only by training centres/institutions approved by the Administration.

- **Staff requirements**

Instructors shall be qualified in the task for which training is being conducted and have appropriate training in instructional techniques and training methods (STCW Code, section A-I/6). The qualifications and experience of instructors and assessors shall be covered in the application of the quality standard provisions of STCW Code, section A-I/8.

- **Teaching facilities and equipment**

A classroom equipped with multimedia equipment and a whiteboard and/ or flipchart should be provided for teaching the theory of the course and group discussions.

Function 1- Navigation at the Support Level

The following additional equipment is recommended:

The trainees should, for training purposes, have access to:

- A magnetic compass and sighting device
- A gyro-compass and pelorus

The following equipment may be required for each trainee including but not limited to:

- Protractor and dividers
- Parallel ruler
- Pocket calculator
- Large and small charts of both ocean and coastal areas
- Navigation triangles

COLREG - A set of table-top models, displaying proper signals or lights, or a magnetic board or navigation light simulator is required for teaching and exercising the collision regulations.

Meteorology - for training purposes it is desirable to have meteorological instruments such as a thermometer, hygrometer, sling psychrometer and barometer.

International Code of Signals - for teaching the use of the Code, a set of rigid code flags with a mast to which they may be attached to represent hoists or computer based system is needed.

Mooring operations - A model showing the windlass and mooring arrangements should be provided for demonstrating anchoring and mooring procedures. The seamanship area should be equipped with lengths of ropes and wires, together with stoppers and various types of shackles, for purposes of illustration.

Function 2 - Cargo Handling and Stowage at the Support Level

The following additional equipment is recommended:

- working models of derricks and cranes including heavy lift to illustrate different rigs in handling cargo models and drawings of various types of hatch covers and their operating and securing arrangements
- Examples of head and heel cargo blocks
- Schematic model of a product tanker, tanks and pump-room, showing piping and valves
- Schematic model of a crude carrier, tanks and pump-room, showing piping and valves
- Photographs, drawings and plans to illustrate different types of ship
- Examples of cargo plans for various types of ship.

Function 3- Controlling the Operation of the Ship and Care for Persons on Board at the Support Level

The following additional equipment is recommended:

- Cut-away three-dimensional models showing the structure of parts of the ship
- Photographs, drawings and plans illustrating various types of ship and constructional details
- A marine hydrometer

  Rigging loft with typical equipment and material
- working models of derricks and cranes including heavy lift to illustrate different rigs in handling cargo models and drawings of various types of hatch covers and their operating and securing arrangements (see Function 2)
- various additional personal protective equipment
- working models of pumps and valves
- working models of winch and bollard
- multimeter, dyspol

Function 4- Maintenance and Repair at the Support Level

- workshop
- work benches with clamping device
- measurement devices, e.g. caliper, micrometer
- manual tools, e.g. open wrench, box wrench, socket wrench, file, hammer, chisel, brush, hacksaw, pliers, cutter, Allen key, crow bar, screw driver

- electric tools, e.g. drilling machine, bench grinding machine, saw
- portable electric and air driven tools, e.g. brush, grinder, cutter, needle hammer
- additional tools, e.g. center punch, twist drill, reamer, cutting disk,
- arc welding device
- gas welding device
- gas cutting device
- brazing device
- working models of mooring winch, anchor winch, crane
- steal surfaces
- different kinds of paint

- **IMO references (R)**

NOTE: -- References shall be latest editions

Up to date details may be found on the IMO web site at http://www.imo.orq.

The following list provides the main Conventions, Regulations and Codes only. Amendments are not listed. It is recommended to follow this link to find the current status of resolutions. When in doubt consult your national maritime administration.

http://www.imo.org/en/KnowledgeCentre/IndexofIMOResolutions/Pages/Default.aspx

R1 International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW) 1978, as amended

R2 International Convention for the Safety of Life at Sea 1974, as amended (SOLAS)

R3 International Conference on Revision of the International Regulations for Preventing Collisions at Sea 1972, as amended (COLREG)

R4 International Convention for the Prevention of Pollution from Ships 73/78, as amended (MARPOL)

R5 Regulations for the Control of Pollution by Noxious Liquid Substances in Bulk (MARPOL 73/78, Annex II)

R6 International Code of Signals

R7 IMO Standard Marine Communication Phrases (IMO SMCP)

R8 International Maritime Dangerous Goods Code (IMDG Code) and Supplement

R9 Medical First Aid Guide for Use in Accidents Involving Dangerous Goods (MFAG)

R10 Emergency Procedures for Ships Carrying Dangerous Goods (EmS)

R11 Reference labels and Placards for the Carriage of Dangerous Goods

R12 IMO Dangerous Goods labels, marks and signs

R13 Code of Safe Practice for Solid Bulk Cargoes

R14 International Maritime Solid Bulk Cargoes Code (IMSBC Code) and Supplement

R15 Code of Safe Practice for Ships Carrying Timber Deck Cargoes

R16 Code of Safe Practice for Cargo Stowage and Securing (CSS Code)

R17 Assembly Resolution A.489 (XII) - Safe Stowage and Securing of Cargo Units and Other Entities in Ships Other Than Cellular Container Ships

R18 Code of Safe Practice for Solid Bulk Cargoes (BC Code)

R19 International Code for the Safe Carriage of Grain in Bulk (International Grain Code)

R20 Code of Practice for the Safe Loading and Unloading of Bulk Carriers (BLU Code)

R21 Assembly Resolution A.533 (13) - Elements to Be Taken Into Account When Considering the Safe Stowage and Securing of Cargo Units and Vehicles in Ships

R22 Assembly Resolution A.581 (14) - Guidelines for Securing Arrangements for the Transport of Road Vehicles on Ro-Ro Ships, as amended

R23 International Code on the Enhanced Programme of Inspections During Surveys of Bulk Carriers and Oil Tankers (ESP Code)

R24 International Convention for Safe Containers (CSC)

R25 Code of Safe Practice for the carriage of cargoes and persons by Offshore Supply Vessels (OSV Code)

R26 Guidelines for the Transport and Handling of Limited Amounts of Hazardous and Noxious Liquid Substances in Bulk on Offshore Support Vessels (LHNS)

R27 Revised Recommendations on the safe Transport of Dangerous Cargoes and Related Activities in Port Areas

R28 Ballast Water Management Convention and the Guidelines for its Implementation

R29 Pollution prevention equipment under MARPOL

R30 United Nations Convention on the Law of the Sea

R31 IMO Assembly Resolution A.760(18) Symbols related to life-saving appliances and arrangements, as amended

R32 International Code for the Construction and Equipment of Ships Carrying Dangerous Chemicals in Bulk (IBC Code),

R33 ILO/IMO/WHO International Medical Guide for Ships

R34 International Safety Management Code (ISM Code) with Guidelines for its Implementation

R35 Guide to Maritime Security and the ISPS Code

R36 International Life-Saving Appliances Code (LSA Code)

R37 International Code for Fire Safety Systems (FSS Code)

R38 Maritime Labour Conventions (MLC).

- **Teaching aids (A)**

Note: The list of teaching aids is recommendations only and are intended to support the learning outcomes of the course.

A1 Instructor Guidance (Part D of this course)

A2 Wall Chart: IMO Dangerous Goods Labels, Marks & Signs

A3 Code on Alerts and indicators

A4 Graphical Symbols for Fire Control Plans

A5 Catalogue of British Admiralty Charts and other Hydrographic Publications

A6 British Admiralty Notices to Mariners

A7 British Admiralty The Mariners Handbook

A8 Chart

A9 Deviation Table

A10 British Admiralty List of Lights

A11 National List of lights and Buoyage System

A12 British Admiralty Tide Table of the area concerned

A13 National tide table

A14 Tidal stream atlas

A15 British Admiralty IALA Maritime Buoyage System

A16 British Admiralty List of Radio Signals, Vol. 2: Radio Aids to Navigation

A17 Cloud sheet 1986 (revised edition). Geneva, World Meteorological Organisation

A18 Marlins Study Pack 1 & Study Pack 2.

A19 Ship's Log-book

A20 Scientific Pocket Calculator

A21 GPS Receiver or Differential GPS (DGPS) Receiver

A22 Echo sounder

A23 Speed Log

A24 Magnetic Compass

A25 Gyro-Compass

A26 Automatic Pilot

A27 Automatic Identification System (AIS) Receiver

A28 Voyage Data Recorder

A29 DVD player

A30 Simulators (wherever applicable to enhance understanding of topics)

A31 Working models

- **Textbooks (T)**

Note: The list of text books are for guidance purpose only.

T1 Bridge Watchkeeping, a practical guide, Nautical Institute

T2 Mooring and Anchoring Ships, Volume 1 and 2, Nautical Institute

T3 Ship Knowledge, Dokmar Publications

T4 The Colregs Guide, Dokmar Publications

T5 21st Century Seamanship, Witherby Seamanship

T6 A Guide to the Collision Avoidance Rules, by Cockcroft and Lameijer

T7 The Boatswain's Manual, Brown, Son and Ferguson, Ltd.

T8 Marine Navigation and Safety of Sea Transportation, Nautical Institute

T9 Shipboard Drills, Witherby Seamanship

T10 Ashley Book of Knots, Doubleday

T11 Illustrated Dictionary of Cargo Handling, Taylor & Francis Ltd

T12 The Theory and Practice of Seamanship, Routledge

T13 Peril at Sea and Salvage, International Chamber of Shipping, OCIMF

T14 Accident Prevention on Board Ship at Sea and in Port, International Labour Office

T15 Code of Safe Working Practices for Merchant Seafarers (COSWP), Maritime Coastguard Agency

T16 Onboard Safety, Witherby Seamanship

T17 Seamanship Techniques – Shipboard & Marine Operations, DJ House

- **DVDs and CBTs (V)**

Note: The list of DVDs and CBTs are for reference only and any other equivalent teaching aids may be prescribed by the Administration.

V1 Safer Mooring (Code No.997)

V2 Theory of Mooring – Edition 4 (Code No. 1104)

V3 Safe Mooring Practice – Edition 4 (Code No. 1105)

V4 Maintenance of Mooring Systems - Edition 4 (Code No. 1106)

V5 Centrifugal pumps - theory & operation (Code No. 9)

V6 Hatch covers - a practical guide (Code No. 938)

V7 Safe use of rigging equipment (Code No. 700)

V8 Fighting pollution - preventing pollution at sea Edition 3 (Code No. 755)

V9 Good bunkering practice Edition 2 (Code No. 962)

V10 Permit to work (Code No. 621)

V11 Entering into enclosed spaces Edition 2 (Code No. 682)

V12 Safe hot work procedures (Code No. 701)

V13 Waste and garbage management (Code No. 627)

Available from: Videotel Marine International Ltd
84 Newman Street, London W1p 3LD, UK
Tel: +44 20 7299 1800 Fax : +44 20 7299 1818
e-mail: mail@videotelmail.com
URL:www.videotel.co.uk

V14 Introduction to MARPOL (CBT # 0092)

V15 HAZMAT - IMDG Code (CBT # 0053)

V16 Hatch Cover Maintenance and Operation (CBT # 0152)

Available from: Seagull ASP.O. Box 1062
N-3194 Horten, Norway
Phone: +47 33 03 09 10
Fax: +47 33 04 62 79
Email: seagull@sgull.com

Rating as Able Seafarer Deck

Function 1:

Navigation at the Support Level

Rating as Able Seafarer Deck
Function 1: Navigation at the Support Level

INDEX

Part B1: Course Outline

Timetable

No formal example of a timetable is included in this model course.

Development of a detailed timetable depends on the level of skills of the trainees entering the course and the amount of revision work of basic principles that may be required. But the course outline gives minimum teaching hours for each topic.

Lecturers must develop their own timetable depending on:

- the level of skills of trainees
- the numbers to be trained
- the number of instructors

and normal practices at the training establishment.

Preparation and planning constitute an important factor which makes a major contribution to the effective presentation of any course of instruction.

Lectures

As far as possible, lectures should be presented within a familiar context and should make use of practical examples. They should be well illustrated with diagrams, photographs and charts where appropriate, and be related to the experience gained in seagoing service.

An effective manner of presentation is to develop a technique of giving information and then reinforcing it. For example, first share with the trainees briefly what you are going to present to them; then cover the topic in detail; and, finally, summarise what you have told them. The appropriate use of teaching aids such as multimedia equipment and presentation slides and providing trainees with adequate course materials will contribute very much in the teaching and learning processes.

Course Outline

The tables that follow list the competencies and areas of knowledge, understanding and proficiency, together with the estimated total hours required for lectures and practical exercises. Teaching staff should note that timings are suggestions only, and should be adapted to suit individual groups of trainees depending on their experience, ability, equipment and staff available for training.

COURSE OUTLINE
Able Seafarer Deck

1.

Knowledge, understanding and proficiency	Total hours for each topic	Total hours for each subject area of required performance
Competence:		
PART 1		
1.1. CONTRIBUTE TO A SAFE NAVIGATIONAL WATCH		(52 hours)
1.1.1. ABILITY TO UNDERSTAND ORDERS AND TO COMMUNICATE WITH THE OFFICER OF THE WATCH ON MATTERS RELEVANT TO WATCHKEEPING DUTIES		
.1 basic knowledge of the English language both written and spoken	(3 hours)	See Entry Standards
.2 familiar use of important nautical and technical shipboard terms	(4 hours)	
1.1.2. PROCEDURES FOR THE RELIEF, MAINTENANCE AND HANDOVER OF A WATCH		
.1 knowledge of the sea and port watch systems	(5 hours)	
.2 recognize the purposes of the individual equipment on the bridge and interpret the values displayed and integrate them in the tasks of watch duty	(5 hours)	
.3 knowledge of the nautical publications that is carried on board	(5 hours)	
1.1.3. INFORMATION REQUIRED TO MAINTAIN A SAFE WATCH		
.1 assist with analyzing of movement of different vessels	(6 hours)	
.2 read course, depth, and speed data from the nautical instruments and assesses them	(4 hours)	
.3 take and correct course data	(4 hours)	
.4 determine vessel's positions	(4 hours)	
.5 recognize the special characteristics of the sea area by studying nautical publications	(4 hours)	

.6	assist with collection and documentation of weather data	(4 hours)
.7	take tidal data from nautical publications	(4 hours)

1.2. CONTRIBUTE TO BERTHING, ANCHORING AND OTHER MOORING OPERATIONS (40 hours)

1.2.1. MOORING SYSTEM AND RELATED PROCEDURES

.1	working knowledge of mooring and tug lines and how each line functions as part of an overall system	(8 hours)
.2	working knowledge of capacities, safe working loads, and breaking strengths of mooring equipment, including mooring wires, synthetic and fibre lines, winches, anchor windlasses, capstans, bitts, chocks and bollards	(8 hours)
.3	working knowledge of procedures and order of events for making fast and letting go mooring and tug lines and wires, including towing lines	(8 hours)
.4	working knowledge of procedures and order of events for the use of anchors in various operations	(8 hours)

1.2.2. PROCEDURES AND ORDER OF EVENTS ASSOCIATED WITH MOORING TO A BUOY OR BUOYS

.1	working knowledge of the procedure and order of events associated with mooring to a buoy or buoys	(8 hours)

Total for Function 1: Navigation at the Support level 92 hours

Teaching staff should note that the hours for lectures and exercises are suggestions only as regards sequence and length of time allocated to each objective. These factors may be adapted by lecturers to suit individual groups of trainees depending on their experience, ability, equipment and staff available for teaching.

Part C1: Detailed Teaching Syllabus

Introduction

The detailed teaching syllabus is presented as a series of learning objectives. The objective, therefore, describes what the trainee must do to demonstrate that the specified knowledge or skill has been transferred.

Thus each training outcome is supported by a number of related performance elements in which the trainee is required to be proficient. The teaching syllabus shows the *required performance* expected of the trainee in the tables that follow.

In order to assist the instructor, references are shown to indicate IMO references and publications, textbooks and teaching aids that instructors may wish to use in preparing and presenting their lessons.

The material listed in the course framework has been used to structure the detailed teaching syllabus; in particular,

IMO references (indicated by R)

Teaching aids (indicated by A)

Textbooks (indicated by T)

CDs and DVDs (indicated by V)

which will provide valuable information to instructors.

Explanation of Information Contained in the Syllabus Tables

The information on each table is systematically organized in the following way. The table describes the FUNCTION with which the training is concerned. A function means a group of tasks, duties and responsibilities as specified in the STCW Code. It describes related activities which make up a professional discipline or task responsibility on board.

In this Model Course there are four functions:

Function 1: Navigation at the Support Level

Function 2: Cargo Handling and Stowage at the Support Level

Function 3: Controlling the Operation of the Ship and Care for Persons on Board at the Support Level.

Function 4: Maintenance and repair at the support level

The first column denotes the **COMPETENCE** concerned. Each function comprises a number of competences. For example, the Function 1, Navigation at the Support Level, comprises a total of two COMPETENCES. Each competence is uniquely and consistently numbered in this model course.

The term competence should be understood as the application of knowledge, understanding, proficiency, skills, and experience for an individual to perform a task, duty or responsibility on board in a safe, efficient and timely manner.

Shown next is the required TRAINING OUTCOME. The training outcomes are the areas of knowledge, understanding and proficiency in which the trainee must be able to demonstrate knowledge and understanding. Each COMPETENCE comprises a number of training outcomes. For example, the competence **Contribute to a safe navigational watch** comprises a total of three training outcomes. Each training outcome is uniquely and consistently numbered in this model course.

Finally, each training outcome embodies a variable number of required performances - as evidence of competence. The instruction, training and learning should lead to the trainee meeting the specified required performance. For the training outcome “Ability to understand orders and to communicate with the officer of the watch on matters relevant to watchkeeping duties”, there are two areas of performance.

Following each numbered area of required performance there is a list of activities that the trainee should complete and which collectively specify the standard of competence that the trainee must meet. These are for the guidance of instructors in designing lessons, lectures, tests and exercises for use in the learning process.

IMO references (Rx) are listed in the column to the right hand side. Teaching aids (Ax), and textbooks (Tx) relevant to the training outcome and required performances are placed immediately following the title.

It is not intended that lessons are organised to follow the sequence of required performances listed in the Tables. The Syllabus Tables are organised to match the competence in STCW Code, Table A-II/5. What is necessary is that all the material is covered and that learning is effective to enable trainees to meet the standard of the required performance.

COMPETENCE 1.1	Contribute to a Safe Navigational Watch	IMO Reference

TRAINING OUTCOMES: STCW Code Table A-II/5

Demonstrates a knowledge and understanding of:

1.1.1 ABILITY TO UNDERSTAND ORDERS AND TO COMMUNICATE WITH THE OFFICER OF THE WATCH ON MATTERS RELEVANT TO WATCHKEEPING DUTIES

1.1.2 PROCEDURES FOR THE RELIEF, MAINTENANCE AND HANDOVER OF A WATCH

1.1.3 INFORMATION REQUIRED TO MAINTAIN A SAFE WATCH

COMPETENCE 1.1	Contribute to a Safe Navigational Watch	IMO Reference

1.1.1 ABILITY TO UNDERSTAND ORDERS AND TO COMMUNICATE WITH THE OFFICER OF THE WATCH ON MATTERS RELEVANT TO WATCHKEEPING DUTIES

IMO references: R1, R2, R3, R6, R7, R10, R30, R31, R34, R35, R36, R37, R38
Teaching aids: A1, A3, A4, A5, A6, A7, A8, A10, A11, A12, A14, A16, A19, A30
Textbooks: T1, T3, T4, T8, T14
CDs and DVDs:

Required Performance:

1.1 basic knowledge of the English language both written and spoken (3 hours) See Entry Standards

- reads and understands appropriate specific texts and written instructions
- is able to answer content related questions
- understands entries in the logbook
- prepares in written form simple instructions, working procedures and precautions
- writes a summary of working results and findings
- presents working results and findings oral
- has sufficient listening skills
- performs short dialogues

1.2 familiar use of important nautical and technical shipboard terms (4 hours) See Entry Standards

- reads general arrangement drawings (extended tasks on spatial understanding), maintenance regulations, and instructions in English
- knows the relevant terms used in navigation and shipboard communication
- identifies and knows the general use of charts and other nautical publications
- identifies and understands meteorological information and messages concerning safety in navigation
- performs the able seafarers duties also with a multi-lingual crew

COMPETENCE 1.1	Contribute to a Safe Navigational Watch	IMO Reference

1.1.2 PROCEDURES FOR THE RELIEF, MAINTENANCE AND HANDOVER OF A WATCH

IMO references: R1, R2, R3, R6, R7, R10, R30, R31, R34, R35, R36, R37, R38
Teaching aids: A1, A3, A4, A5, A6, A7, A8, A9, A10, A11, A12, A14, A15, A16, A18, A19, A21, A22, A23, A24, A25, A26, A27, A28, A29, A30
Textbooks: T1, T3, T4, T6, T8, T14, T15
CDs and DVDs:

Required Performance:

2.1 knowledge of the sea and port watch systems (5 hours)

- Maintenance, handover and relief of the watch are in conformity with accepted practices and procedures.

2.2 [recognize the purposes of the individual equipment on the bridge and interpret the values displayed and integrate them in the tasks of watch duty (5 hours)

- has basic knowledge about function and application of navigation devices, especially RADAR, GPS, log and AIS
- has basic knowledge of mathematics to solve navigational calculations]

2.3 knowledge of the nautical publications that is carried on board (5 hours)

- has elementary knowledge about basic content and use of Nautical Charts used on board
- has elementary knowledge about basic content and use of Nautical Publications that are available on board

1.1.3 INFORMATION REQUIRED TO MAINTAIN A SAFE WATCH

IMO references: R1, R2, R3, R6, R7, R10, R30, R31, R34, R35, R36, R37, R38
Teaching aids: A1, A3, A4, A5, A6, A7, A8, A9, A10, A11, A12, A14, A15, A16, A17, A18, A19, A21, A22, A23, A24, A25, A26, A27, A28, A29, A30
Textbooks: T1, T3, T4, T6, T8, T14, T15
CDs and DVDs

Required Performance:

3.1 assist with analyzing of movement of different vessels (6 hours)

- Identifies and understands the sound, light and flag signals pertaining to ships' operations and maneuvers.

3.2 read course, depth, and speed data from the nautical instruments and assess them (4 hours)

- [is able to start up and operate navigation devices under the supervision of the Officer of the watch]
- determines the time with respect to the time units used on board and convert local time in the respective time zones.
- [reads course, depth, and speed data from the nautical instruments (gyro and magnetic compass, sonar, and logs) and is able to assess the values displayed and to integrate them in the tasks of their watch duty].

3.3 take and correct course data (4 hours)

- describes the direction of the ship's head on a gyro-compass (gyro course)
- describes the direction of the ship's head on a magnetic compass (compass course)
- determines errors in readings of magnetic and gyro compasses and apply corrections to courses and bearings.

3.4 determine vessel's positions (4 hours)

- identifies 'earth's poles', 'equator' and 'meridians'
- identifies 'latitude' and 'parallels of latitude', 'prime meridian' and 'longitude'
- identifies 'difference of latitude' and 'difference of longitude'
- describes the earth as an ellipsoid
- recognizes 'international nautical mile', 'cable' and 'knot'
- demonstrates basic knowledge of chart projections
- [demonstrates basic knowledge of the use of a chart catalogue
- demonstrates basic knowledge of electronic charts
- demonstrates how to measure the distance between two positions on a Mercator chart based on the latitude of the two positions]

- defines a position
- gives the radar distance off a charted object and plots its position circle on a chart
- plots a position on the chart from simultaneous cross bearings and from bearing and distance off
- Identifies landmarks and navigational aids and understand their purposes

3.5 recognize the special characteristics of the sea area by studying nautical publications (4 hours)

- recognizes the symbols and abbreviations on a chart, especially lighthouses, buoys, beacons, radio beacons and other navigational marks
- identifies the characteristics and range of lights
- [recognizes coastlines, coast and radar-responsive targets
- recognizes traffic lanes and separation zones]

3.6 assist with collection and documentation of weather data (4 hours)

- has basic knowledge in meteorology
- uses thermometers, barometers, psychrometers and hygrometers
- documents the weather data

[3.7 take tidal data from nautical publications (4 hours)

- uses the tidal information given on a chart
- uses the tidal information provided in nautical publications]

COMPETENCE 1.2	Contribute to berthing, anchoring and other mooring operations	IMO Reference

1.2.1 MOORING SYSTEM AND RELATED PROCEDURES

IMO references: R1, R2, R4, R29, R30, R34, R36, R38
Teaching aids: A12, A31
Textbooks: T2, T3, T5, T7, T10, T12, T13, T14, T15, T16, T17
CDs and DVDs:

Required Performance:

1.1 working knowledge of mooring and tug lines and how each line functions as part of an overall system (8 hours)

- has working knowledge of mooring line systems and related procedures
- has working knowledge of tug line systems and related procedures

1.2 working knowledge of capacities, safe working loads, and breaking strengths of mooring equipment, including mooring wires, synthetic and fibre lines, winches, anchor windlasses, capstans, bitts, chocks and bollards (8 hours)

- knows the terms safe working load (SWL), working load limit (WLL) and minimum breaking strength (MBS)
- has working knowledge about mooring and tug lines (mooring wires, synthetic and fibre lines) and their SWL, WLL and/or MBS
- understands the SWL, WLL and MBS of winches, capstans, bitts, leads, chocks, hawses, bollards, capstans and windlasses

1.3 working knowledge of procedures and order of events for making fast and letting go mooring and tug lines and wires, including towing lines (8 hours)

- demonstrate how to make fast tugs on towing hawsers or lashed up alongside
- describes the use of fenders during berthing and when secured in position
- has knowledge of the safe working area and the no-go area
- understands snap back zones, the danger associated with them and demonstrate taking safety precautions against the snapping back
- explains the sequence of mooring/unmooring operations and safe working practice in mooring
- performs in accordance with established safety practices the necessary activities for the preparation and carrying out of
  - a pilot change and deploy a pilot ladder for the change of pilot
  - berthing and un-berthing
- identifies leads, bitts and connections suitable for towing
- understands the use of a messenger in taking, giving or receiving a towing line or other heavy duty line
- secures and let go tug lines
- makes use of the communication rules, including hand signs

- applies the necessary rigging works (knots and splicing) safely in the context of good seamanship

1.4 working knowledge of procedures and order of events for the use of anchors in various operations (8 hours)

- performs in accordance with established safety practices the necessary activities for the preparation and carrying out of anchoring
- identifies and reports markings on an anchor cable
- displays appropriate signal when anchored

COMPETENCE 1.2	Contribute to berthing, anchoring and other mooring operations	IMO Reference

1.2.2 PROCEDURES AND ORDER OF EVENTS ASSOCIATED WITH MOORING TO A BUOY OR BUOYS

IMO references: R1, R2, R4, R29, R30, R34, R36, R38
Teaching aids: A12, A31
Textbooks: T2, T3, T5, T7, T10, T12, T13, T14, T15, T16, T17
CDs and DVDs:

Required Performance:

2.1 working knowledge of the procedure and order of events associated with mooring to a buoy or buoys (8 hours)

- Knows the purpose of mooring to a buoy
- Knows and describes methods of mooring to a buoy
- Knows and understands the preparations for picking up mooring hawser
- Knows, understands and demonstrates the use of Pick Up / Messenger Rope for running cables and the risks associated with them
- Knows and understands the arrangements of chafe chains, chafe gear and marker buoys

Part D1: Instructor manual

The following notes are intended to highlight the main objectives or training outcomes of each part of the function. The notes also contain some material on topics, which are not adequately covered in the quoted references.

Trainees will be aware of the need and the practical measures required performing the following aspect of shipboard operations

- Contribute to a safe navigational watch
- Contribute to berthing, anchoring and other mooring operations

Function 1: Navigation at the Support Level

This function covers the theoretical and practical training in safe navigation at the support level necessary for the effective and safe execution of the tasks within the context of the operations of the ship.

On completion of training for this function, trainees will be able to support the OOW during the navigational watch properly in every aspect and communicate accordingly. Furthermore the trainees will have achieved professional competence to perform their deck rating duties during berthing, mooring and anchoring of the vessel.

1.1 Contribute to a safe navigational watch

In implementing the section of this course, the instructor should ensure that the trainees have prior and adequate training and experience as ratings and have demonstrated the ability to perform tasks as required of ratings.

1.1.1 Ability to understand orders and to communicate with the officer of the watch (OOW) on matters relevant to watchkeeping duties

1.1.1.1 Basic knowledge of the English language both written and spoken

Instructors should refer to IMO Model Course 3.17, Maritime English and also to the IMO Marine Standard Communication Phrases.

In lessons and/or custom-made training situations trainees perform typical watch duties on board. The instructor’s major tasks are to provide the typical working environment together with certain training situations that the trainees will likely face on board.

Within this professional environment trainees will necessarily start to communicate.

It is recommended to provide the trainees also with typical material, publications etc. which are usually available on board, e.g. logbooks, instructions, procedures, drawings, operating instructions, maintenance manuals, nautical publications, charts etc.

In such a professional environment the instructor can place the trainees' tasks to use the English language in written and spoken form to achieve the necessary competences to be able to perform their forthcoming duties.

1.1.1.2 Familiar use of important nautical and technical shipboard terms

Instructor should refer to IMO Model Course 3.17, Maritime English, to the IMO Marine Standard Communication Phrases and to the references given in Part C1 of this course.

1.1.2 Procedures for the relief, maintenance and handover of a watch

On completion trainees will know the sea and harbour watch systems. Maintenance, handover and relief of the watch are in conformity with accepted practices and procedures.

1.1.2.1 Knowledge of the sea and port watch systems

Instructors can refer to the following basic requirements for watch keeping:

- The bridge watch keeping is maintained 24 hours a day, no matter at sea or at anchor.
- The navigation watch is usually divided into 4-hour periods.
- In order to ensure navigation safety, the Master should decide the watch keeping standard level according to the actual navigational situation. Navigational watch keeping standards can be divided into three watch keeping Levels.

Level 1: Good visibility, ocean/coastline navigation, low density of traffic: one OOW and one Deck Rating forming part of the watch, auto piloting;

Level 2: Navigating in a restricted area, moderate density of traffic: one OOW (if necessary Master on bridge), two Deck Ratings (one of them assisting in lookout), hand steering;

Level 3: Navigating in restricted visibility, high density of traffic or in a restricted area: Master commanding on bridge, one OOW (if necessary two OOWs), two Deck Ratings (one of them assisting in lookout), hand steering.

- Usual watch keeping schedule
  Chief Officer's watch: 0400 ~ 0800; 1600 ~ 2000
  Second Officer's watch: 0000 ~ 0400; 1200 ~ 1600
  Third Officer's watch: 0800 ~ 1200; 2000 ~ 2400
- In port the system of 6 hours watch periods can be adopted.
- Watch keeping personnel on the bridge should be dressed neatly and concentrate on watch keeping and lookout duties.
- Watch keeping personnel on bridge must be clear that the safety of life and the safety of ship take precedence over all other considerations.

Instructors can refer to the following basic procedures of relief and handover of a watch:

- The relieving rating should be on the bridge in advance at least 5 minutes, familiarizing himself with the prevailing circumstances and conditions as well as ship's position, speed, course, steering system and so on;
- Before taking over the watch, the night eyes should be obtained by the relieving rating;
- The rating should not hand over the watch to the relieving rating if he has reason to believe that the latter is obviously not capable of carrying out his duties effectively, in which case he should notify the OOW;
- The watch should never be handed over if the ship was altering course or taking action to avoid collision;
- The relieved rating must never leave the bridge until he confirms that the relieving rating has fully understood the vessel`s current situation;
- During sailing or anchoring, taking over and handing over the watch should be carried out on the bridge. It is not allowed to change the watch through third party or by telephone;
- The watch is not to be relieved in case of emergency or abnormal circumstances without master`s permission.

Instructors can refer to the following basic information required for changing watch

- Other vessels movements in the vicinity;
- Condition of the steering gear and steering system;
- Courses of gyro and magnetic compasses;
- Conditions in cargo holds and regular safety inspections;
- Exhibition of signal flags, lights and shapes;
- Preparations of arrival and departure, e.g. pilot ladder, signal flags, lights, shapes, lightings;
- Tasks instructed by OOW have not been finished.

1.1.2.2 Recognize the purposes of the individual equipment on the bridge and interpret the values displayed and integrate them in the tasks of watch duty

It is the instructor's duty to teach basic function and basic use of main navigation devices:

- Magnetic Compass
- Gyro Compass
- RADAR
- ECDIS, e.g. different display modes, ECDIS symbols, ECDIS alarms etc.
- VHF and GMDSS, e.g. VHF routine communication channels, concept of GMDSS etc.
- GPS
- Log
- AIS, e.g. plotter display, target list display, CPA, TCPA, AIS alarms etc.
- ECHO-SOUNDER

The trainee shall learn to start up and operate navigation devices under the supervision of the OOW. Furthermore the trainee shall be able to solve basic navigational calculations.

Furthermore it is the instructor's duty to teach basic knowledge of function and basic use of main steering system, steering gear together with changeover procedures between AUTO (pilot), FU (follow up or hand) and NFU (non-follow up).

The trainee shall learn to use RADRA and ARPA for look out.

1.1.2.3 Knowledge of the nautical publications that is carried on board

It is the instructor's duty to teach the trainees about the basic content and basic use of Nautical Charts & Publications that are available on board, e.g.

- Adequate charts for the intended voyage – up to date
- Chart catalog – up to date
- Admiralty Sailing Directions / NGA Sailing Directions
- Admiralty List of Lights / NGA List of Lights
- Notices to Mariners
- Admiralty Tide Tables / NOAA Tide Tables
- Mariners Handbook
- Nautical Almanac
- Navigational Tables
- Admiralty List Of Radio Signals Volumes I to VI Global Maritime Distress and Safety System (GMDSS) / NGA Radio Aids
- Tidal stream atlases
- Ocean Passages for the World

1.1.3 Information required to maintain a safe watch

1.1.3.1 Assist with analysing of movement of different vessels

A proper lookout shall be maintained at all times in compliance with rule 5 of the International Regulations for Preventing Collisions at Sea, 1972 and shall serve the purpose of:

- Maintaining a continuous state of vigilance by sight and hearing as well as by all other available means, with regard to any significant change in the operating environment;
- Fully appraising the situation and the risk of collision, stranding and other dangers to navigation;
- Detecting ships or aircraft in distress, shipwrecked persons, wrecks, debris and other hazards to safe navigation.

The lookout must be able to give full attention to the keeping of a proper lookout and no other duties shall be undertaken or assigned which could interfere with that task.

Means of proper lookout and precautions are

- By sight and binoculars: lookout should be carried out at different position on the bridge to avoid any blind angle;
- By radar: change the range scales frequently, especially 3–6 mile scales, adjust the anti-clutter rain and anti-clutter sea carefully, be sure not to eliminate the necessary target echoes;
- By hearing: keep quiet on the bridge, open the bridge wing doors, and lookout should be carried out on the bridge wing decks in poor visibility;

- VHF Listening and AIS watch: keep listening watch on channel 16 or another channel designated, understand and pay attention to the traffic movement. Pay special attention to the navigational warnings in fog;
- Forecastle Lookout: If present circumstances so require, a lookout at forecastle should be arranged. Master must ensure that the good communication is maintained between the bridge and the forecastle;
- It is helpful for lookout that the information and navigational warnings communicated from other vessels and the developments have been met with in the previous watch.

1.1.3.2 Read course, depth, and speed data from the nautical instruments and assesses them

It is the instructor's duty based on the already provided explanation of the basic function of the main navigation devices to teach the following:

- Magnetic Compass, e.g. how to read and assess the information
- Gyro Compass, e.g. how to read and assess the information
- GPS, e.g. different display modes, available satellites, how to read the basic information (POSITION, SOG, COG etc.), GPS alarms (arrival alarm, anchor watch alarm, cross track error)
- ECHO-SOUNDER, e.g. how to read and assess the depth information, ECHO-SOUNDER alarms.
- Log, e.g. how to read and assess speed information
- RADAR, e.g. basic principles of radar target detection, different radar modes (relative and true motion), how to identify, plot and collect target information (such as bearing and distance), radar alarms etc.

1.1.3.3 Take and correct course data

It is the instructor's duty to do basic navigational calculations with the trainees.

Based on the readings of magnetic compass, gyro compass and / or GPS the respective course data has to be assessed accordingly and put into the chart and back.

1.1.3.4 Determine vessel's positions

It is the instructor's duty to do basic navigational calculations with the trainees.

Based on the readings of GPS data together with bearings taken with magnetic compass, gyro compass and / or RADAR trainees shall be able to determine vessel's position and to put this position into the chart. Plausibility checks can probably done with the echo sounder.

1.1.3.5 Recognize the special characteristics of the sea area by studying nautical publications

It is the instructor's duty based on the already provided explanation of the Nautical Charts & Publications to go into further detail.

There are certain publications that provide special information of certain sea areas. This information will be very important for route and passage planning but also for the installations of special safety precautions, e.g. against a local weather phenomenon.

Furthermore there can be actual situations in a certain sea area.

This kind of information can for instance be taken from:

- Admiralty Sailing Directions / NGA Sailing Directions
- Notices to Mariners
- Mariners Handbook
- Nautical Almanac
- Navigational Tables

1.1.3.6 Assist with collection and documentation of weather data

It is the instructor's duty to teach basic function and basic use of the main meteorological devices:

- Thermometers for ambient air and water surface temperatures
- Psychrometer
- Barometer, Barograph
- Anemometer

Under the supervision of the OOW it is the trainees duty to determine the actual weather data on a regular basis during the navigational watch and to do calculations if necessary. This set of weather data has to be reported to the OOW or to be put into the vessel's log and probably further documents.

The trainees shall understand that continuously documented weather data will enable the OOW to do a weather forecast.

In this connection trainees should also be made familiar with publications like cloud atlas or see scale pictures.

1.1.3.7 Take tidal data from nautical publications

It is the instructor's duty based on the already provided explanation of the Nautical Charts & Publications to go into further detail.

There are certain publications that provide special information of certain sea areas. The tidal characteristics of estuary or port of call will be very important for the harbour watch but also for route and passage planning.

This kind of information can for instance be taken from:

- Admiralty Sailing Directions / NGA Sailing Directions
- Admiralty Tide Tables / NOAA Tide Tables
- Mariners Handbook
- Nautical Almanac
- Navigational Tables
- Tidal stream atlases

The trainees should basically understand the following abbreviations:

- MSL: mean sea level
- CD: chart datum
- TD: tidal datum
- MHWS: mean high water springs
- MLWS: mean low water springs
- MHWN: mean high water neap
- MLWN: mean low water neap
- HHW: higher high water
- LHW: lower high water
- HLW: higher low water
- LLW: lower low water

1.2 Contribute to berthing, anchoring and other mooring operations

In implementing the section of this course, the instructor should ensure that the trainees have prior and adequate training and experience as ratings and have demonstrated the ability to perform tasks as required of ratings.

1.2.1 Mooring system and related procedures

1.2.1.1 Working knowledge of mooring and tug lines and how each line functions as part of an overall system

The trainees shall master the handling of winches and ropes used in the mooring and unmooring in a harbour, in the warping and anchoring of ships. Hereby they use the communication rules, including the hand signs, and the measures for the safety at work.

The trainees achieve working knowledge of mooring line systems and related procedures and fully understand the following terms:

- Spring line: to control the ship’s ranging movement.
- Breast line: to control the ship’s lateral movement.
- Head/stern line: general control of both ranging and lateral movements including any yawing.
- Buoy line: sent out from the head or stern of the vessel to connect the front-end eye splice of the line with the buoy ring, to provide holding power for the vessel.
- Slip line: usually sent out from the head of the vessel, through the buoy ring and back to the head of the vessel again, with both ends fastened on the vessel, so that the unmooring of the line can be controlled by the crew. It is slack and does not provide holding power during mooring.
- Heaving line: a type of lightweight line used on board ship to establish a connection with people in another ship, people on the shore, or shipmates who have gone overboard. These lightweight ropes are typically weighted at one end, classically with a monkey's fist knot, and they are very easy to throw across long distances.
- Stopper: used to transfer the weight of the mooring rope from the winch to the bitts or vice versa. Two types of stoppers are in common use, rope and chain: rope stoppers are used in the handling of fiber mooring ropes, chain stoppers

are used in the handling of wire mooring ropes.

- Rat guard: a disk of sheet metal fitted around a hawser to prevent rats from boarding a vessel moored at a dock.
- Snap back zone: Use of lines of different material and the danger associated with them, safety precautions to be taken.
- Bumper: A bumper used to absorb the kinetic energy of a boat or vessel berthing against a jetty, quay wall or other vessel. Fenders are used to prevent damage to boats, vessels and berthing structures. The type of fender that is most suitable for an application depends on many variables, including dimensions and displacement of the vessel, maximum allowable stand-off, berthing structure, tidal variations and other berth-specific conditions.

1.2.1.2 Working knowledge of capacities, safe working loads, and breaking strengths of mooring equipment, including mooring wires, synthetic and fibre lines, winches, anchor windlasses, capstans, bitts, chocks and bollards

It is the instructor's duty to explain the definitions of the specific values SWL, WLL and MBS as listed below and transfer them into rules and procedures to use installations, e.g. winches, windlasses etc. together with the mooring equipment, e.g. mooring wires, synthetic lines etc.

(SWL) Safe working load: It is generally considered to be the breaking load of a component divided by an appropriate factor of safety giving a 'safe' load that could be lifted or be carried. Safe working load is 1/6 of breaking strength in general, and is 1/10 or less of breaking strength when using it to hoist a person.

(WLL) Working load limit: The maximum mass or force which a product is authorized to support in general service when the pull is applied in-line, unless noted otherwise, with respect to the centreline of the product. The WLL of a component is specified by the manufacturer.

(MBS) Minimum breaking strength: MBS is the minimum amount of force required to break an object, often referred to as tensile strength or breaking strength

1.2.1.3 Working knowledge of procedures and order of events for making fast and letting go mooring and tug lines and wires, including towing lines

The trainees achieve professional knowledge of mooring/unmooring operations, related procedures, respective safe working practice and fully understand the following:

Before arrival

- Checking condition of messenger, heaving line, stopper and mooring ropes;
- Testing mooring winches;
- Checking condition and SWL of winches, fairleads, chocks and bollards and maintain mooring equipment in good condition;
- Non-slip mooring deck to be maintained.

During operation

- Laying out mooring rope, preparing heaving line and stopper, standby one spare

heaving line;
- Giving signal to linesman when sending heaving line ashore;
- Getting permission to send the first line;
- Repeating orders and report to bridge on every operation carried out;
- Controlling mooring rope speed when paying out/heaving up;
- Ensuring mooring ropes keep clear of fenders, bow thruster and propeller;
- Monitoring stress of mooring rope, adjust as required;
- Monitoring crew position in relation to mooring ropes, to keep clear of mooring rope during slack/heaving up. Keep clear of snap-back zone;
- Monitoring vessel movement/clearance, report useful information to bridge.
- Being able to perform in accordance with established safety practices the necessary activities for the preparation and carrying out of a pilot change and deploying a pilot ladder for the change of pilot, as well as berthing and un-berthing.
- Being able to identify leads, bitts and connections suitable for towing, understand the use of a messenger in taking, giving or receiving a towing line or other heavy duty line, secure and let go tug lines, make use of the communication rules, including hand signs, and apply the necessary rigging works (knots and splicing) safely in the context of good seamanship

Watch keeping duties with respect to mooring

- Keeping watch at the gangway;
- Assisting the duty officer in cargo operation (hatch cover opening / closing, sounding, securing cranes);
- Adjusting the mooring lines or ropes.

The trainees shall achieve working knowledge of tug line systems and related tug operation procedures and fully understand the following:

Before arrival

- Checking condition of messenger, heaving line, stopper and mooring rope;
- Testing capstan, mooring winch, non-slip mooring deck to be maintained;
- Checking condition of winch, fairlead, chocks and bollards.

During operation

- Officer in charge keeping communication with tug boat by hand signals;
- Ensuring tug line to be clear of bow thruster and propeller;
- Monitoring stress of tug line and heaving line;
- Monitoring crew's position in relation to tug's line, keeping clear of heaving line during heaving up, keeping clear of snap-back zone;
- Reporting to bridge when tug line make fast/cast off.

1.2.1.4 Working knowledge of procedures and order of events for the use of anchors in various operations

The trainees shall achieve professional knowledge of anchoring operations, related procedures together with respective safe working practice.

An example lesson is given in Appendix 1

1.2.2 Procedures and order of events associated with mooring to a buoy or buoys

1.2.2.1 Procedures and order of events associated with mooring to a buoy or buoys

The trainees shall achieve basic knowledge of the purpose of mooring to a buoy, related procedures, respective safe working practice and fully understand the following:

A mooring buoy is a type of buoy, to which, ships can be moored in the deep oceanic areas. A mooring buoy weighs more than the general type of buoys.

The mooring buoy is designed in a manner that there is a heavier weight located right in the bottom of the sea. This weight is like an anchor holding the buoy afloat in the water. A mooring buoy has loops or chains attached to its top that floats on the water. These chains are provided so that ships or boats can be effectively moored to them. The entire application of a mooring buoy works in such a way that the buoy is floating while the ships are moored to a very firm support without using the anchor system of halting a ship. In some parts of the world, mooring buoys are also used to moor boats and ships away from areas where coral reefs thrive.

Ships using mooring buoys to protect coral reefs do so because when the traditional types of anchors are used, they tend to dig and uproot the coral that lie deep under the water surface. This would cause a huge loss to the marine ecosystem. By using a mooring buoy, two purposes are served – the ships are moored appropriately and the loss to the marine life-forms is prevented. Such mooring buoys in coral reef areas are located mainly in Australia, Asia and also in some parts of the United States.

Mooring to a buoy by use of ship's anchor chain:

Preparation for mooring to a buoy:

- Preparing the tools & equipment.
- Hanging off the anchor, allowing sufficient space in the hawse pipe for the buoy chain to pass through smoothly.
  - Connecting the heaving–in wire to fluke of anchor;
  - Lowering the anchor and simultaneously start heaving in the above wire afterward;
  - Making fast the above anchor, then secure adequate length of chain to the deck.
- Walking back the anchor chain laying down on deck until the first joining shackle (kenter shackle) is reached.
- Uncoupling the joining shackle (kenter shackle), utilizing a taper-pin punch and a shackle-pin punch, removing the taper-pin and then cutting (split) off.
- Connecting a buoy shackle with and link to the anchor chain.

- Fixing the hanging off wire of the anchor chain to the 6th or 7th link from the end link.
- Lowering the chain adjusting the hanging wire of & to ensure no tangling.
- Securing the hanging wire to bollard after being lowered to within a few meters above water.
- Securing the anchor chain with a bit of slack (windlass brake on and clutch off).
- Lowering the shackle pin immediately before connecting the buoy shackle to buoy.
- Preparing the buoy rope (hawser).
- Preparing the slipping wire.

Buoy mooring

- Sending the buoy rope (hawser) to the buoy and heaving in the rope until the buoy is right under the ship's bow.
- When the buoy under the ship's bow, lowering the hanging wire with buoy hackle adjusting and connecting the anchor-shackle to the buoy.
- Lowering the anchor chain to an adequate distance from the buoy.
- Casting off the buoy rope (hawser).
- Sending the slipping wire to the buoy.

Releasing buoy chain

- Heaving in the buoy chain until the buoy comes under the ship's bow.
- Heaving in the slipping wire simultaneously until the same condition of the above and securing it to the bollard.
- Slacking the buoy chain slightly and releasing the buoy shackle.
- Heaving in the anchor chain to the deck.
- Casting off the slipping wire.

Connecting anchor

- Confirming the chain not being twisted, connect the anchor chain again with a kenter shackle which was removed.
- Resuming heaving in the anchor chain slowly and simultaneously slack the heave-in wire rope for anchor.
- Connecting the anchor.

Single buoy mooring (SBM)

SBM or single point mooring system is a method by which only the bow of a vessel, particularly for liquid cargo carriers, is moored to buoy or fixed structure allowing the vessel to swing freely in all directions. Thus, the ship can stay at the berth with minimum tension to the mooring rope.

Tools and equipment needed

- Messenger rope (30mm~32mm diameter and 100 meter length) 2 pieces.
- Utility ropes.
- Large sized bar.
- Hammers, sennit, seamans-knife, srease, waste clothes.

Preparation

Vessels are moored with two synthetic fiber ropes to which a piece of short chafing chain is connected at the end so that the mooring lines may not wear out by contact with the fairlead. The short chain is tied up to the bow chain stopper of the vessel.

- Freeing the winch drum for hauling in a pickup hawser, and fit a messenger rope to the drum (not applicable to a ship equipped with an exclusive winch for SBM).
- Lowering a messenger rope close to sea level to pick the SBM hawser.
- Then heaving up the messenger rope and towing rope, and heave in the slack with care, as the SBM comes closer.

Making SBM rope fast

The Smit Bracket and bow chain stopper methods are two ways to make fast a mooring rope to SBM.

Unmooring from SBM

- Testing the winch without load, then heave the pick-up wire until the chafe chain is clear of the chain stopper.
- Freeing the stopper and then lower the chain wire, towing rope one by one up to the connection of the messenger rope comes to lie on deck.
- Casting off all buoy ropes.

Rating as Able Seafarer Deck
Function 2
Cargo Handling and Stowage at the Support Level

Rating as able seafarer deck
Function 2: Cargo Handling and Stowage at the Support Level

INDEX

Part B2: Course Outline

Timetable

No formal example of a timetable is included in this model course.

Development of a detailed timetable depends on the level of skills of the trainees entering the course and the amount of revision work of basic principles that may be required.

Instructors must develop their own timetable depending on:

- the level of skills of trainees
- the numbers to be trained
- the number of instructors

and normal practices at the training establishment.

Preparation and planning constitute an important factor which makes a major contribution to the effective presentation of any course of instruction.

Lectures

As far as possible, lectures should be presented within a familiar context and should make use of practical examples. They should be well illustrated with diagrams, photographs and charts where appropriate, and be related to matter learned during seagoing time.

An effective manner of presentation is to develop a technique of giving information and then reinforcing it. For example, first share with the trainees briefly what you are going to present to them; then cover the topic in detail; and, finally, summarise what you have told them. The appropriate use of teaching aids such as multimedia equipment and presentation slides and providing trainees with adequate course materials will contribute very much in the teaching and learning processes.

Course Outline

The tables that follow list the competencies and areas of knowledge, understanding and proficiency, together with the estimated total hours required for lectures and practical exercises. Teaching staff should note that timings are suggestions only and should be adapted to suit individual groups of trainees depending on their experience, ability, equipment and staff available for training.

PART 2 – AB (DECK)

COURSE OUTLINE

2.

Knowledge, understanding and proficiency	Total hours for each topic	Total hours for each subject area of required performance
Competence:		
2.1. CONTRIBUTE TO THE HANDLING OF CARGO AND STORES		(60 hours)
2.1.1. KNOWLEDGE OF PROCEDURES FOR SAFE HANDLING, STOWAGE AND SECURING OF CARGOES AND STORES, INCLUDING DANGEROUS, HAZARDOUS AND HARMFUL SUBSTANCES AND LIQUIDS		
.1 Securing Cargoes	(10 hours)	
.2 Container Cargo	(2 hours)	
.3 Bulk Cargo	(3 hours)	
.4 Bulk Grain Cargo	(4 hours)	
.5 Cargo Care	(9 hours)	
.6 Dangerous, Hazardous and Harmful Cargoes	(8 hours)	
.7 Cargo Handling Equipment and Safety	(7 hours)	
.8 Oil Tanker Piping and Pumping Arrangements	(4 hours)	
.9 Cargo Plans	(6 hours)	
.10 Contribute to the handling of stores	(8 hours)	
2.1.2. BASIC KNOWLEDGE OF AND PRECAUTIONS TO OBSERVE IN CONNECTION WITH PARTICULAR TYPES OF CARGO AND IDENTIFICATION OF IMDG LABELLING		(40 hours)
.1 Basic knowledge of and precautions to observe in connection with particular types of cargo	(12 hours)	
.2 Basic knowledge of the classification of Dangerous Goods and the precautions to be observed	(10 hours)	
.3 Identification of Dangerous Goods by IMDG Labelling	(4 hours)	
	(4 hours)	

.4 Identification of the Convention, Code and publications to refer to when transporting dangerous goods by sea	(4 hours)
.5 Identification of the main IMDG-related documents to be carried on board and knowledge of their uses	(6 hours)
.6 Basic knowledge and understanding of IMDG segregation table and its application	

Total for Function 2: Cargo Handling and Stowage at the Support Level 100 hours

Teaching staff should note that the hours for lectures and exercises are suggestions only as regards sequence and length of time allocated to each objective. These factors may be adapted by lecturers to suit individual groups of trainees depending on their experience, ability, equipment and staff available for teaching.

Part C2: Detailed Teaching Syllabus

Introduction

The detailed teaching syllabus is presented as a series of learning objectives. The objective, therefore, describes what the trainee must do to demonstrate that the specified knowledge or skill has been transferred.

Thus each training outcome is supported by a number of related performance elements in which the trainee is required to be proficient. The teaching syllabus shows the *required performance* expected of the trainee in the tables that follow.

In order to assist the instructor, references are shown to indicate IMO references and publications, textbooks and teaching aids that instructors may wish to use in preparing and presenting their lessons.

The material listed in the course framework has been used to structure the detailed teaching syllabus; in particular,

Teaching aids (indicated by A)

IMO references (indicated by R) and

Textbooks (indicated by T)

CDs and DVDs (indicated by V)

will provide valuable information to instructors.

Explanation of Information Contained in the Syllabus Tables

The information on each table is systematically organized in the following way. The table describes the FUNCTION with which the training is concerned. A function means a group of tasks, duties and responsibilities as specified in the STCW Code. It describes related activities which make up a professional discipline or task responsibility on board.

In this Model Course there are four functions:

Function 1: Navigation at the Support Level

Function 2: Cargo Handling and Stowage at the Support Level

Function 3: Controlling the Operation of the Ship and Care for Persons on Board at the Support Level.

Function 4: Maintenance and repair at the support level

The first column denotes the **COMPETENCE** concerned. Each function comprises a number of competences. For example, the Function 2, Cargo Handling and Stowage at the Support Level, comprises a single COMPETENCE. Each competence is uniquely and consistently numbered in this model course.

The term competence should be understood as the application of knowledge, understanding, proficiency, skills, and experience for an individual to perform a task, duty or responsibility on board in a safe, efficient and timely manner.

Shown next is the required TRAINING OUTCOME. The training outcomes are the areas of knowledge, understanding and proficiency in which the trainee must be able to demonstrate knowledge and understanding. Each COMPETENCE comprises a number of training outcomes. For example, the competence **Contribute to the handling of cargo and stores** comprises a total of two training outcomes. Each training outcome is uniquely and consistently numbered in this model course.

Finally, each training outcome embodies a variable number of required performances - as evidence of competence. The instruction, training and learning should lead to the trainee meeting the specified required performance. For the training outcome concerned with safe handling, stowage and securing of cargoes, there are eleven areas of performance.

Following each numbered area of required performance there is a list of activities that the trainee should complete and which collectively specify the standard of competence that the trainee must meet. These are for the guidance of instructors in designing lessons, lectures, tests and exercises for use in the teaching process.

IMO references (Rx) are listed in the column to the right hand side. Teaching aids (Ax), and textbooks (Tx) relevant to the training outcome and required performances are placed immediately following the title.

It is not intended that lessons are organised to follow the sequence of required performances listed in the Tables. The Syllabus Tables are organised to match with the competence in the STCW Code Table A-II/5. What is necessary is that all the material is covered and that teaching is effective to allow trainees to meet the standard of the required performance.

PART 2 – AB DECK

COMPETENCE 2.1	Contribute to the handling of cargo and stores	IMO Reference

TRAINING OUTCOMES: STCW Code Table A-II/5

Demonstrates a knowledge and understanding of:

2.1.1 KNOWLEDGE OF PROCEDURES FOR SAFE HANDLING, STOWAGE AND SECURING OF CARGOES AND STORES, INCLUDING DANGEROUS, HAZARDOUS AND HARMFUL SUBSTANCES AND LIQUIDS

2.1.2 BASIC KNOWLEDGE OF AND PRECAUTIONS TO OBSERVE IN CONNECTION WITH PARTICULAR TYPES OF CARGO AND IDENTIFICATION OF IMDG LABELLING

Further information is covered by model course 1.10 Dangerous, Hazardous and Harmful Cargoes.

COMPETENCE 2.1	Contribute to the handling of cargo and stores	IMO Reference

2.1.1 KNOWLEDGE OF PROCEDURES FOR SAFE HANDLING, STOWAGE AND SECURING OF CARGOES AND STORES, INCLUDING DANGEROUS, HAZARDOUS AND HARMFUL SUBSTANCES AND LIQUIDS

IMO references: R4, R5, R7, R8, R9, R10, R11, R12, R13, R14, R15, R16, R17, R18, R19, R20, R21, R22, R23, R24, R26, R27, R28, R32, R34, R35, R38
Teaching aids: A1, A2, A30
Textbooks: T5, T7, T11, T12, T14, T15
CDs and DVDs:

Required Performance:

1.1 Securing Cargoes (10 hours)

- knows that detailed information is contained in Code of Safe Practice for Cargo Stowage and Securing (CSS Code) and all cargo stowage and securing should be in accordance of CSS Code and Cargo Securing Manual (CSM)
- understands the need for solid stow and securing of all cargoes
- performs methods of blocking, lashing, shoring, chocking and tombing cargo under supervision of duty officer
- performs methods of securing cargo faces resulting from part discharge before making a sea passage under supervision of duty officer
- performs methods of securing heavy loads and heavy lifts under supervision of duty officer
- performs methods of stowing and securing vehicles and trailers under supervision of duty officer
- understands the safe loading/discharging of Ro-Ro cargoes
- secures unitized, containers, trailers, portable tanks and other cargo in accordance with the ship's cargo securing arrangements manual
- understands that that hatches should be securely closed and cleated before loading over them
- understands that that stowage should leave safe access to essential equipment and spaces needed to navigate and operate the ship
- rigs guard lines or rails at the sides of a deck stow and at openings in the stow

1.2 Container Cargo (2 hours)

- describes the arrangement of a container ship and explains how the position of a particular container is designated
- understands the sequence of operations during discharging and loading at a terminal
- knows the types and sizes of container in use
- recognizes markings and labelling on containers
- checks and recognized that container security seals are intact

1.3 Bulk Cargo (Other Than Grain) (3 hours)

- describes the preparation of cargo holds prior to loading bulk cargoes
- prepares the cargo hold under the supervision of the duty officer
- understands that some bulk cargoes may deplete the oxygen content of holds or produce toxic gases and describes the precautions to take before entry of holds
- understands the hazards and the precautions to take during loading and discharging coal

1.4 Bulk Grain Cargo (4 hours)

- understands the technical terms that are used in the International Grain Code
- describes the cleaning and preparation of holds and decks for the carriage of grain
- prepares the cargo hold under the supervision of the duty officer
- understands that a thorough check for insect or rodent infestation should be made
- understands the dangers associated with using insecticide in cargo holds
- carries out, as appropriate, securing arrangements for grain cargo as contained in the International Code for the Safe Carriage of Grain in Bulk (International Grain Code)

1.5 Cargo Care (9 hours)

1.5.1 Preparation of Holds and Segregation of Cargoes

- explains the importance of cleaning holds before loading
- describes how to clean holds after discharge of a general cargo
- understands that the use of a deodorizing wash for ozonator may be necessary to remove strong odours from a previous cargo
- prepares the cargo hold under the supervision of the duty officer
- understands the reasons for using dunnage and knows types and sizes of material used for dunnage
- performs the methods of dunnaging a hold for various cargoes and how to dispose of old dunnage under supervision of duty officer
- understands that bilges or drain wells shall be clean, dry and sweet-smelling disinfectants used
- explains how bilge suctions should be checked for efficient working scuppers and sounding pipes
- understands how lumbers and drain well covers should be treated to prevent suctions being blocked by small debris, but ensuring free drainage to the suctions
- understands the need for the separation and segregation of different cargoes

1.5.2 Ventilation and Control

- understands the factors involved in the control of sweat by ventilation
- understands the systems of natural and forced ventilation to minimise the formation of sweat
- understands that ventilation is also required for the removal of heat, gases and odours
- reports the properties measured and recorded at the control panel

1.5.3 Refrigerated Cargo

- explains how holds and lockers are prepared for loading
- prepares the cargo hold under the supervision of the duty officer
- understands the need for the pre-cooling of spaces and dunnage to be used
- gives examples of cargoes carried chilled or frozen
- understands the purpose of compartment temperature recordings

1.6 Dangerous, Hazardous and Harmful Cargoes (8 hours)

see also 2.1.2

- understands where to look for damage and defects most commonly encountered due to:
  - loading and unloading operation
  - corrosion
  - severe weather conditions
- understands that any incident or doubts during the handling of dangerous goods shall be reported immediately to the duty officer

1.7 Cargo Handling Equipment and Safety (7 hours)

1.7.1 Cargo Handling Equipment

- knows the publications, documents and ship's plans that contain detailed information pertaining to rigging and maintenance of ship's handling equipment and associated gears
- performs the care and maintenance of cargo gear on board
- performs the rigging of derricks for loading and discharging cargo
- states that gear should be set up in accordance with the ship's rigging plan and explains limitations
- uses slings, snotters, canvas slings, trays, pallets, nets, chain slings, cant hooks, bale hooks and vehicle slings
- states the precautions to be taken when fork-lift trucks or similar devices are used in the 'tween-decks or holds

1.7.2 Cargo Handling Safety

- understands that each cargo gear has its capabilities and limitations
- understands that all cargo gear and equipment shall be visually inspected before and during cargo operations
- states that all ropes and wires should come with the certificate of their properties
- understands how to determine when a cargo runner needs replacing
- states that mechanically or hydraulically operated hatches should be opened or closed by the ship's crew under the supervision of a responsible person
- states that hatch covers should be secured by locking devices to prevent them moving accidentally
- states that beams and covers of partially opened hatches should be secured to prevent their accidental displacement
- states that hatch openings shall be securely fenced
- states that no person should stand, pass or work under a suspended load
- describes the provision of adequate lighting for working spaces, portable lights and precaution with dangerous cargoes
- states that portable lights should be removed from cargo spaces as soon as they are no longer required

- states that unattended portable lights are potential fire hazards
- describes the importance of maintaining close communication with the personnel on charge ashore during the loading and unloading

1.8 Oil Tanker Piping and Pumping Arrangements (4 hours)

- (Specific training for tankers may be required as specified under Chapter V of the STCW-Code)
  The subtopics are covered by the IMO model course MC 1.01 Basic training for oil and chemical tanker cargo operations

1.8.1 Tanker Arrangement

- describes, for crude carriers and product tankers, the general arrangement of:
  - cargo tanks
  - pump-rooms
  - segregated ballast tanks
  - slop tanks
  - cofferdams - peak tanks - deep tanks
  - accommodation
  - ventilators leading to accommodation and machinery spaces

1.8.2 Cargo Piping System

- describes the direct pipeline arrangement in crude carriers
- describes the ring-main system in a product tanker
- describes the piping arrangements in a pump-room
- describes the system of individual deep-well pumps for a product tanker
- explains the arrangement and use of:
  - deck lines
  - drop lines
  - stripping lines
  - crossovers
  - bypasses
  - master valves
  - tank suction valves
  - sea suction valves

1.8.3 Cargo Pumps

- understands the main operating features of centrifugal pumps, positive-displacement pumps, eductor pumps and stripping pumps
- understands the conditions for which the pumps are being used such as stripping
- understands the safe handling of chemical cargoes
- understands the safe handling of liquefied gas cargoes
- uses ship/shore checklist

1.9 Cargo Plans (6 hours)

- extracts basic information from cargo plans of general cargo ships or container ships

1.10 Contribute to the handling of stores (8 hours)

- operates the hoists/cranes used for handling the ship's stores/spares
- understands that each handling gear has its capabilities and limitations
- understands that all handling gear and equipment shall be visually inspected
- states that all ropes and wires should come with the certificate of their properties
- states that no person should stand, pass or work under a suspended load
- describes the provision of adequate lighting for working spaces, portable lights and precaution with dangerous stores
- describes the importance of maintaining close communication with the personnel on charge ashore during the handling of stores
- Stows, lashes and secures the stores/spares safely under supervision of duty officer
- understands the classification of dangerous stores
- understands the reason and need for segregation dangerous stores
- describes procedures to follow in event of spillage of dangerous stores

COMPETENCE 2.1	Contribute to the handling of cargo and stores	IMO Reference

2.1.2 BASIC KNOWLEDGE OF AND PRECAUTIONS TO OBSERVE IN CONNECTION WITH PARTICULAR TYPES OF CARGO AND IDENTIFICATION OF IMDG LABELLING

IMO references: R4, R5, R7, R8, R9, R10, R11, R12, R13, R14, R15, R16, R17, R18, R19, R20, R21, R22, R23, R24, R26, R27, R28, R32, R34, R35, R38
Teaching aids: A1, A2, A30
Textbooks: T5, T7, T12, T12, T14, T15
CDs and DVDs:

Required Performance:

2.1 Basic knowledge of and precautions to observe in connection with particular types of cargo (25 hours)

- understands with the aid of diagrams, the meaning of the following stowage and segregation requirements for the different types of ships
- observes the fire precautions which shall be taken when handling dangerous goods
- understands the general requirements for carrying timber cargoes on deck
- understands the general requirements for carrying different cargoes, e.g. timber, paper, steel coils etc. inside the cargo hold
- demonstrates to able to assist with securing different types of cargo stowed below deck
- demonstrates to be able to assist with securing different types of cargo stowed on deck
- understands the general requirements for carrying heavy cargo on deck
- understands the general requirements for carrying heavy cargo inside the cargo hold
- understands the reason and need for segregation dangerous goods
- describes procedures to follow in event of spillage of dangerous goods
- observes the fire precautions which shall be taken when handling dangerous goods

2.2 Identification of IMDG Labelling (15 hours)

- understands the classification of dangerous goods in the International Maritime Dangerous Goods (IMDG) Code
- identifies the marking, labelling and placarding of dangerous goods as required by the IMDG Code and DGs in limited quantities

Part D2: Instructor manual

The following notes are intended to highlight the main objectives or training outcomes of each part of the function. The notes also contain some material on topics which are not adequately covered in the quoted references.

Trainees will be aware of the need and the practical measures required performing the following aspect of shipboard operations

- Contribute to the safe handling, stowage and securing of cargoes and stores, including dangerous, hazardous and harmful substances and liquids
- Contribute to precautions to observe in connection with particular types of cargo and identification of IMDG labelling

Function 2: Cargo Handling and Stowage at the Support Level

This function covers the theory and practice of cargo handling and stowage at the support level necessary for the effective and safe execution of the tasks within the context of the operations of the ship.

On completion of training for this function, trainees will be able to carry out the preparation and dunnaging of holds and will be aware of the importance of adequately securing cargo to prevent damage to the ship or cargo.

The trainees will be able to handle cargoes and stores in accordance with established safety procedures and equipment operating instructions.

They will be aware of handling dangerous, hazardous and harmful cargoes or stores in compliance with established safety practices (IMDG Code, COSWP and other IMO Conventions and Codes).

Training concerned with Dangerous, Hazardous and Harmful Cargoes is covered in IMO model course 1.10.

2.1 Contribute to the handling of cargo and stores

In implementing the section of this course, the instructor should ensure that the trainees have prior and adequate training and experience as ratings and have demonstrated the ability to perform tasks as required of ratings.

2.1.1 Knowledge of procedures for safe handling, stowage and securing of cargoes and stores, including dangerous, hazardous and harmful substances and liquids

2.1.1.1 Securing Cargoes

The instructor has to make the trainees familiar with the full variety of different cargoes and the different ways to pack them for shipping.

In the next step the trainees need a full overview about different types of merchant vessels and the explanation why cargo has to be lashed properly.

In a further step the instructor can assign the trainees with tasks to load different cargo on different vessel and secure it properly on board finally. In this connection safe working procedures have to be followed. Stowage plans and lash plans have to be observed and the typical lashing equipment has to be used.

2.1.1.2 Container Cargo

Based on and additional to the general securing of cargoes, the instructor's task is to teach the "Container" to the trainees into detail. It is recommended to use technical drawings first to explain construction, dimensions and technical terms of a typical 20 foot standard container. In a next step the instructor can introduce further sizes and types.

Modern containers are designed for safe transport and quick loading and discharging but the trainees have to be made aware of loading and lashing procedures together with the checks that have to be made.

2.1.1.3 Bulk Cargo

With regard to bulk cargo it is the instructor's task to focus on this special type of cargo and even more on this special type of merchant vessel. The trainees will understand that due to the nature of different bulk cargoes the bulk carrier has to have special features. The instructor has to explain how a cargo hold has to be prepared for a certain cargo.

Furthermore the instructor has to emphasise the dangerous properties of different bulk cargoes and the precautions that have to be taken before and when entering or opening a bulk carrier cargo hold. The general function principle and the use of a common atmosphere testing device has to be part of the lessons.

2.1.1.4 Bulk Grain Cargo

A special kind of bulk cargo is grain cargo. It can be shipped in containers but also in bulk carriers.

Due to the fact the grain is food the preparation and cleanliness of the cargo hold is of utmost importance.

It also important for the trainees to know that grain often has to be loaded in the bulk carrier using special installations to secure grain in the respective cargo hold. The trainees have to understand that back on board they have to follow the instructions of the OOW strictly.

It is common practice that grain in containers and cargo holds is fumigated with harmful substances. Therefore the cargo holds have to be entered or opened using special safety precautions.

2.1.1.5 Cargo Care

Based on the introduction into different kinds of cargo and merchant vessels the instructor's task is to perform advanced training to enable the trainees to fully contribute to cargo care on board.

Before cargo can be loaded the hold has to be prepared properly. Within the lessons not only cargo hold cleaning procedures have to be taught the trainees have to understand why and how some cargo residues can form strong odours and how they can be removed.

As soon as the complete hold including bilge wells etc. is clean and free from odours further cargo hold preparation has to be done.

The cargo bilge system has been operational.

In this connection the instructor can explain, based on the initial information about bulk and grain cargo, how bilge wells can be protected against ingress of cargo or even dunnage.

Furthermore the instructor has to inform the trainees how grain bulkheads etc. are installed and why and how dunnage is used while stowing breakbulk cargo.

It is also important that the instructor starts to explain that some cargo cannot be stowed together for certain reasons and that there are strict rules that the OOW has to follow. Of course this explanation has to be continued with respect especially to dangerous cargo.

The cargo hold ventilation system has to be operative as well.

As soon as the cargo is loaded the vessel is responsible for its care. The trainees need a professional knowledge about different cargo and its properties. During the sea passage until the discharge of cargo the necessary steps to keep up the cargo quality have to be taken. These steps depend on the kind of cargo, vessel and also on the ambient (weather) conditions inside the cargo hold and outside.

The instructor has to explain which conditions cargo has to be transported:

- completely sealed from the environment
- ventilated with fresh air
- under controlled atmosphere
- in heated condition
- in refrigerated condition

It will be not the trainees' task to operate the technical systems that provide the above mentioned way of transport but the forthcoming deck ratings have to gain a professional understanding because on board they have to be able to identify and monitor the different systems under the supervision of the OOW.

Refrigerated and heated cargo need an even higher sophisticated merchant vessel. This kind of cargo has to be transported at a specified temperature during the full transport chain.

2.1.1.6 Dangerous, Hazardous and Harmful Cargoes

Additional to the already taught different cargo properties, certain cargo has also dangerous properties.

The instructor has to teach details of the IMDG-Code to an extend that the forthcoming deck ratings easily identify the IMDG labels on cargo, know the main risks, understand that this cargo has to be put exactly at the planned stowing position on board. It will be the deck ratings task to report the OOW any finding or observation especially with regard to dangerous cargo immediately.

The instructor has to highlight that certain activities are prohibited, such as using open flames and smoking.

Furthermore the trainees have to have adequate knowledge of common procedures which have to be followed in the event of leakage or spillage of dangerous, hazardous and harmful cargoes and stores.

For further information Instructors should refer to IMO Model Course 1.10.

2.1.1.7 Cargo Handling Equipment and Safety

Cargo can be handled with a wide variety of equipment. It is recommended that the instructor informs the trainees about the typical cargo handling equipment which is installed on merchant vessels that she/he has introduced already. The trainees need to know the working principle and operation but also typical repair and maintenance of this equipment.

With regard to the safe operation of this equipment the trainees have to learn in which way and up to which limits the cargo handling gear can be used and they also have to understand use and limitations of the associated equipment.

It is very important that the trainees achieve the professional understanding that only certified and proper working cargo gear and cargo equipment may be used for cargo handling.

During Cargo handling cargo holds usually have to be opened. The instructor has to inform the trainees about the involved and often additional risks and about the common safety precautions.

2.1.1.8 Oil Tanker Piping and Pumping Arrangements

Instructors should refer to IMO Model Course 1.01.

2.1.1.9 Cargo Plans

Based on the already introduced merchant vessel types the instructor has to present the corresponding cargo plans to the trainees.

The trainees have to be able to identify the typical stowing position of cargo within the plan and on the vessel.

2.1.1.10 Contribute to handling of stores

Stores are important equipment for the operation of the vessel. Stores have to be brought on board and stored properly.

Stores can be handled with a variety of equipment. It is recommended that the instructor informs the trainees about the typical stores handling equipment which is installed on merchant vessels. The trainees need to know the working principle and operation but also typical repair and maintenance of this equipment.

With regard to the safe operation of this equipment the trainees have to learn in which way and up to which limits the stores handling gear can be used and they also have to understand use and limitations of the associated equipment.

It is very important that the trainees achieve the professional understanding that only certified and proper working gear and equipment may be used for stores handling.

During stores handling holds etc. usually have to be opened. The instructor has to inform the trainees about the involved and often additional risks and about the common safety precautions.

2.1.2 Basic knowledge of and precautions to observe in connection with particular types of cargo and identification of IMDG labelling

Trainees should be able to identify the Conventions, Codes and publications to refer with respect to the carriage of dangerous, hazardous and harmful cargoes and substances. They should able to able to recognize IMDG labels, placard and associated markings and the need to segregate these goods in accordance with the IMDG Code.

The trainees should have adequate knowledge and understanding on the procedures to follow in the event of leakage or spillage of dangerous, hazardous and harmful cargoes and stores.

During the practical aspect of training, the instructor should emphasized on the trainees the safe operation and procedures to follow so that the optimum level of results can be obtained, including;

- Recognise markings and labels that indicate stores or cargoes are classified as dangerous goods
- Recognise DG placards and marking of cargo transport units including intermediate bulk containers (IBCs)
- Understand that dangerous goods are always stowed and segregated in accordance with the IMDG Code
- Describe procedure to follow in event of leakage of dangerous, hazard and harmful stores or cargoes
- Understand the reasons and need for separation of dangerous, hazardous and harmful stores or cargoes
- Understand the need to secure dangerous goods and to secure adjacent cargoes
- Check container security seals are intact and not tampered with

2.1.2.1 Basic knowledge of and precautions to observe in connection with particular types of cargo

In a simulated work related context, demonstrate basic knowledge of and precautions to observe in connection with particular types of cargo.

Instructors should refer to references for further guidance on this topic.

2.1.2.2 Basic knowledge of the classification of Dangerous Goods and the precautions to be observed

It should be known to trainees that personnel handling dangerous goods or substances should be trained in the contents of dangerous goods provisions commensurate with their responsibilities.

Instructors should refer to IMO Model Course 1.10 Dangerous, Hazardous and Harmful Cargoes (2014 Edition) and to references for further guidance on this topic.

The MC comes with a CD which contains PowerPoint presentations on the IMDG Code.

2.1.2.3 Identification of Dangerous Goods by IMDG Labelling

In a simulated work related context, demonstrate basic knowledge of the identification of IMDG labelling in accordance with the IMDG Code.

Trainees should know that all dangerous goods classed under IMDG Code should be marked and labelled, and in addition, dangerous goods which are also marine pollutants must be marked with marine pollutant labels.

Instructors should refer to IMO Model Course 1.10 Dangerous, Hazardous and Harmful Cargoes and to references for further guidance on this topic.

2.1.2.4 Identification of the Convention, Code and publications to refer to when transporting dangerous goods by sea

Carriage of dangerous goods and substances should be in accordance with the following provisions.

- SOLAS Convention
- MARPOL Convention
- International Maritime Dangerous Goods (IMDG)

Trainees should know the publications that contained the list of dangerous goods and substances and other essential information such as the UN numbers and proper shipping names (PSN).

Instructors should refer to IMO Model Course 1.10 Dangerous, Hazardous and Harmful Cargoes and to references for further guidance on this topic.

2.1.2.5 Identification of the main IMDG-related documents to be carried on board and knowledge of their uses

The instructor should highlight to the trainees, amongst other things, the purpose of identifying IMDG with the UN Numbers and PSN with regards to segregations, and emergency response procedures.

Instructors should refer to IMO Model Course 1.10 Dangerous, Hazardous and Harmful Cargoes and to references for further guidance on this topic.

2.1.2.6 Basic knowledge and understanding of IMDG segregation table and its application

Instructors should refer to IMO Model Course 1.10 Dangerous, Hazardous and Harmful Cargoes and to references for further guidance on this topic.

Rating as able seafarer deck

Function 3

Controlling the Operation of the Ship and Care for Persons on Board at the Support Level

Rating as able seafarer deck
Function 3: Controlling the Operation of the Ship and Care for Persons on Board at the Support Level

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Part B3: Course Outline

Timetable

No formal example of a timetable is included in this model course.

Development of a detailed timetable depends on the level of skills of the trainees entering the course and the amount of revision work of basic principles that may be required.

Lecturers must develop their own timetable depending on:

- the level of skills of trainees
- the numbers to be trained
- the number of instructors

and normal practices at the training establishment.

Preparation and planning constitute an important factor which makes a major contribution to the effective presentation of any course of instruction.

Lectures

As far as possible, lectures should be presented within a familiar context and should make use of practical examples. They should be well illustrated with diagrams, photographs and charts where appropriate, and be related to matter learned during seagoing time.

An effective manner of presentation is to develop a technique of giving information and then reinforcing it. For example, first share with the trainees briefly what you are going to present to them; then cover the topic in detail; and, finally, summarise what you have told them. The appropriate use of teaching aids such as multimedia equipment and presentation slides and providing trainees with adequate course materials will contribute very much in the teaching and learning processes.

Course Outline

The tables that follow list the competencies and areas of knowledge, understanding and proficiency, together with the estimated total hours required for lectures and practical exercises. Teaching staff should note that timings are suggestions only and should be adapted to suit individual groups of trainees depending on their experience, ability, equipment and staff available for training.

COURSE OUTLINE

3.

Knowledge, understanding and proficiency	Total hours for each topic	Total hours for each subject area of required performance
Competence:		
3.1. CONTRIBUTE TO THE SAFE OPERATION OF DECK EQUIPMENT AND MACHINERY		(42 hours)
3.1.1. KNOWLEDGE OF DECK EQUIPMENT INCLUDING		
.1 Function and uses of valves and pumps, hoists, cranes, booms, and related equipment	(2 hours)	
.2 Function and uses winches, windlasses, capstans and related equipment	(2 hours)	
.3 Hatches, watertight doors, ports, and related equipment	(1 hour)	
.4 Fibre and wire ropes, cables and chains, including their construction, use, markings, maintenance and proper stowage	(1 hour)	
.5 Ability to use and understand basic signals for the operation of equipment, including winches, windlasses, cranes, and hoists	(0,5 hours)	
.6 Ability to operate anchoring equipment under various conditions, such as anchoring, weighing anchor, securing for sea, and in emergencies	(5,5 hours)	
3.1.2. KNOWLEDGE OF THE FOLLOWING PROCEDURES AND ABILITY TO		
.1 Rig and unrig bosun's chairs and staging	(4 hours)	
.2 Rig and unrig pilot ladders, hoists, rat-guards and gangways	(2 hours)	
.3 Use marlin spike seamanship skills, including the proper use of knots, splices and stoppers	(16 hours)	
3.1.3. DECK AND CARGO-HANDLING GEAR AND EQUIPMENT		
.1 Access arrangements, hatches and hatch covers, ramps, side/ bow/stern doors or elevators	(2 hours)	
.2 Pipeline systems – bilge and ballast suctions and wells	(2 hours)	
.3 Cranes, derricks, winches	(2 hours)	
3.1.4. HOISTING AND DIPPING FLAGS AND THE MAIN SINGLE- FLAG SIGNALS. (A, B, G, H, O,	(2 hours)	

P, Q)

3.2. APPLY OCCUPATIONAL HEALTH AND SAFETY PRECAUTIONS (30 hours)

3.2.1. SAFE WORKING PRACTICES AND PERSONAL SHIPBOARD SAFETY

.1 working aloft and over the side	(6 hours)
.2 working in enclosed spaces	(2 hours)
.3 permit to work systems	(1 hour)
.4 line handling	(3 hours)
.5 lifting techniques and methods of preventing back injury	(1 hour)
.6 electrical safety	(6 hours)
.7 mechanical safety	(4 hours)
.8 chemical and biohazard safety	(2 hours)
.9 personal protective equipment	(2 hours)
.10 is able to communicate with other persons on board on elementary safety matters	(1,5 hours)
.11 is able to understand safety Information symbols, signs and alarm signals	(1,5 hours)

3.3. APPLY PRECAUTIONS AND CONTRIBUTE TO THE PREVENTION OF POLLUTION OF THE MARINE ENVIRONMENT (18 hours)

3.3.1. KNOWLEDGE OF THE PRECAUTIONS TO BE TAKEN TO PREVENT POLLUTION OF THE MARINE ENVIRONMENT

.1 Basic knowledge of MARPOL 73/78	(4 hours)
.2 Proactive measures to protect the marine environment	(4 hours)

3.3.2. KNOWLEDGE OF THE USE AND OPERATION OF ANTI-POLLUTION EQUIPMENT

.1 Operating procedures of anti-pollution equipment	(4 hours)

3.3.3. KNOWLEDGE OF THE APPROVED METHODS FOR DISPOSAL OF MARINE POLLUTANTS

.1 Disposal of Garbage	(4 hours)
.2 Exchange of ballast water	(2 hours)

3.4. OPERATE SURVIVAL CRAFT AND RESCUE BOATS

See IMO Model Course 1.23, and STCW Code Section A-VI/2 paragraph 1 to 4.

Total for Function 3: Controlling the Operation of the Ship and Care for Persons on Board at the Support Level

90 hours

Teaching staff should note that the hours for lectures and exercises are suggestions only as regards sequence and length of time allocated to each objective. These factors may be adapted by lecturers to suit individual groups of trainees depending on their experience, ability, equipment and staff available for teaching.

Part C3: Detailed Teaching Syllabus

Introduction

The detailed teaching syllabus is presented as a series of learning objectives. The objective, therefore, describes what the trainee must do to demonstrate that the specified knowledge or skill has been transferred.

Thus each training outcome is supported by a number of related performance elements in which the trainee is required to be proficient. The teaching syllabus shows the *required performance* expected of the trainee in the tables that follow.

In order to assist the instructor, references are shown to indicate IMO references and publications, textbooks and teaching aids that instructors may wish to use in preparing and presenting their lessons.

The material listed in the course framework has been used to structure the detailed teaching syllabus, in particular:

Teaching aids (indicated by A)

IMO references (indicated by R)

Textbooks (indicated by T) and

CDs and DVDs (indicated by V)

will provide valuable information to instructors.

Explanation of Information Contained in the Syllabus Tables

The information on each table is systematically organized in the following way. The table describes the FUNCTION with which the training is concerned. A function means a group of tasks, duties and responsibilities as specified in the STCW Code. It describes related activities which make up a professional discipline or task responsibility on board.

In this Model Course there are four functions at the Support Level:

Function 1: Navigation;

Function 2: Cargo Handling and Stowage;

Function 3: Controlling the Operation of the Ship and Care for Persons on Board;

Function 4: Maintenance and repair.

The first column denotes the COMPETENCE concerned. Each function comprises several competences. For example, Function 3: Controlling the Operation of the Ship and Care for Persons on Board, comprises a total of four COMPETENCES. Each competence is uniquely and consistently numbered in this model course.

The term competence should be understood as the application of knowledge, understanding and proficiency, skills and experience for an individual to perform a task, duty or responsibility on board in a safe, efficient and timely manner.

Shown next is the required TRAINING OUTCOME. The training outcomes are the areas of knowledge, understanding and proficiency in which the trainee must be able to demonstrate knowledge and understanding. Each COMPETENCE comprises a

number of training outcomes. For example, the above competence comprises four training outcomes. Each training outcome is uniquely and consistently numbered in this model course.

Finally, each training outcome embodies a variable number of required performances - as evidence of competence. The instruction, training and learning should lead to the trainee meeting the specified required performance. For the training outcome concerned with deck equipment there are six areas of performance.

Following each numbered area of required performance, there is a list of activities that the trainee should complete and which collectively specify the standard of competence that the trainee must meet. These are for the guidance of instructors in designing lessons, lectures, tests and exercises for use in the teaching process.

IMO references (Rx) are listed in the column to the right hand side. Teaching aids (Ax), textbooks (Tx) and CDs and DVDs (Vx) relevant to the training outcome and required performances are placed immediately following the title.

It is not intended that lessons are organized to follow the sequence of required performances listed in the Tables. The Syllabus Tables are organised to match with the required competences in STCW Code, Table A-II/5. What is necessary is that all the areas are covered and that learning is effective to allow trainees to meet the standard of the required performance.

COMPETENCE 3.1	Contribute to the safe operation of deck equipment and machinery	IMO Reference

TRAINING OUTCOMES: STCW Code Table A-II/5

Demonstrates a knowledge and understanding of:

3.1.1 KNOWLEDGE OF DECK EQUIPMENT

3.1.2 KNOWLEDGE OF THE FOLLOWING PROCEDURES AND ABILITY TO

3.1.3 USE AND HANDLING OF DECK AND CARGO-HANDLING GEAR AND EQUIPMENT

3.1.4 KNOWLEDGE OF HOISTING AND DIPPING FLAGS AND THE MAIN SINGLE-FLAG SIGNALS. (A, B, G, H, O, P, Q)

COMPETENCE 3.1	Contribute to the safe operation of deck equipment and machinery	IMO Reference

3.1.1 KNOWLEDGE OF DECK EQUIPMENT

IMO references: R1, R2, R4, R7,
Teaching aids: A30, A31
Textbooks: T2, T5, T7, T12, T14, T15, T16, T17
DVDs and CBTs: V1, V2, V3, V4, V5, V6, V7, V16

Required Performance:

1.1 Function and uses of valves and pumps, hoists, cranes, booms, and related equipment (2 hours)

- Has working knowledge of the different types and function principles of pumps and valves
- Has working knowledge of emergency procedures and is able to assist the OOW with testing emergency shutdown of pumps and associated valves
- Has working knowledge of the use of portable winches and pumps
- Has working knowledge of the different types and function principles of hoists, cranes and booms
- Is able to perform basic visual checks of hoists, cranes and booms and related equipment
- Knows the importance that any failure, damage or malfunction has to be reported to OOW immediately
- Prepares and uses different hoists, cranes and booms
- Understands that derricks and guys have to be moved in a combination
- Understands and uses the basic signals for the operation of the different deck equipment
- Understands that in case of dead spots during cargo or stores operation additional signallers have to be available
- Understands that booms have limiting angles
- Understands that cranes should not be used for dragging
- Identifies and explains safe working load (SWL) or working load limit (WWL) of equipment
- Understands that a load greater than SWL shall not be lifted
- Identifies SWL of shackles, chains and slings correctly
- Has working knowledge of how to sling, lift and move different kind of cargo in a secure and safe manner
- Has working knowledge of different lashing techniques

1.2 Function and uses of winches, windlasses, capstans and related equipment (2 hours)

- Has working knowledge of the different types and function principles of capstan and winches
- Prepares and uses different winches, windlasses, capstans and related equipment
- Has working knowledge of different lashing techniques

1.3 Hatches, watertight doors, ports and related equipment (1 hour)

- Has working knowledge of the different types and function principles of hatches, ports and related equipment
- Understands the safety precautions to be applied in case hatch covers are opened, moved, secured and closed
- Understands that every opening has to be secured as necessary
- Has working knowledge of the different types of hatch covers seals, their function principle, function testing and maintenance
- Has working knowledge of the different types, function principle and safe operation of watertight doors

1.4 Fibre and wire ropes, cables and chains including their construction, use, markings, maintenance and proper stowage (1 hour)

- Explains construction and features of fibre ropes, wire ropes, cables and chains
- Understands that manufacturers' instructions and rules with regard to safe handling must be followed

1.5 Ability to use and understand basic signals for the operation of equipment, including winches, windlasses, cranes, and hoists (0,5 hours)

- Understands commonly used hand signals for control of lifting appliances and winches, e.g. Code of Hand Signals

1.6 Ability to operate anchoring equipment under various conditions, such as anchoring, weighing anchor, securing for sea and in emergencies (5,5 hours)

- Has working knowledge of the function principle of the anchor equipment on board and its use
- Knows how to make loose anchor chain in case of emergency

COMPETENCE 3.1	Contribute to the safe operation of deck equipment and machinery	IMO Reference

3.1.2 KNOWLEDGE OF THE FOLLOWING PROCEDURES AND ABILITY TO

IMO references: R1, R2, R36,
Teaching aids: A29, A30, A31
Textbooks: T3, T5, T7, T10, T11, T12, T14 T15, T16, T17
CDs and DVDs:

Required Performance:

2.1 Rig and unrig bosun's chairs and staging (4 hours)

- Has working knowledge of the rigging of a bosun's chair with gantline, double sheet bend and seizing
- Demonstrates use of bosun's chair
- Has working knowledge of the rigging of stages and cradles
- Understands the importance of a proper inspection, testing, use and stowage of bosun's chair, staging, gantline and related equipment
- Demonstrates takling and boatswain's seam

2.2 Rig and unrig pilot ladders, hoists, rat-guards and gangways (2 hours)

- Has working knowledge of rigging/stowing gangways and accommodation ladders with regard to safety
- Has working knowledge of securely rigging safety nets to prevent persons falling between ship and quay or onto the quay
- Has working knowledge of rigging and attending rat guards
- Has working knowledge of rigging and stowing pilot ladders, including pilot hoist
- Understands that pilot ladders are usually reserved for pilots only

2.3 Use marlin spike seamanship skills, including the proper use of knots, splices and stoppers (16 hours)

- Demonstrates use of knots, bends and hitches
- Demonstrates chain stoppers or rope stoppers
- Demonstrates seizing to cargo gear shackles
- Demonstrates eye splice and long splice in fibre rope
- Demonstrates eye splices in wire rope, is able to parcel and serve a wire rope splice
- Demonstrates eye splice in multi-strand plaited rope

COMPETENCE 3.1	Contribute to the safe operation of deck equipment and machinery	IMO Reference

3.1.3 USE AND HANDLING OF DECK AND CARGO-HANDLING GEAR AND EQUIPMENT

IMO references: R1, R2, R34,
Teaching aids: A29, A30, A31
Textbooks: T3, T5, T7, T10, T11, T12, T14, T15, T16, T17
CDs and DVDs:

Required Performance:

3.1 Access arrangements, hatches and hatch covers, ramps, side/ bow/stern doors or freight elevators (2 hours)

- Understands the safety hazards in opening/closing ramps, doors, freight elevators etc
- Has working knowledge of operating ramps, doors, freight elevators etc
- Understands that defects in any lifting equipment and gears have to be reported immediately
- Understands the effect on ship stability and watertight integrity, if doors are unsecured

3.2 Pipeline systems – bilge and ballast suctions and wells (2 hours)

- Has knowledge of bunkering of fresh water
- Recognizes pipeline colour code markings for fresh water, sea water, fuel oil and lube oil
- Has knowledge of ballast operations
- Has knowledge of checking and cleaning of tank suctions, strum boxes and wells
- Sounds ballast water tanks and cargo hold bilges

3.3 Cranes, derricks, winches (2 hours)

- Has working knowledge of the different types and function principles of cranes, derricks and winches
- Is able to perform basic visual checks of cranes, derricks, winches and related equipment
- Knows the importance that any failure, damage or malfunction has to be reported to OOW immediately
- Prepares and uses cranes, derricks and winches
- Understands and uses the basic signals for the operation of deck equipment
- Understands that in case of dead spots during cargo or stores operation additional signallers have to be available
- Identifies SWL of shackles, chains and slings correctly
- Has working knowledge of how to sling, lift and move different kind of cargo in a secure and safe manner

COMPETENCE 3.1	Contribute to the safe operation of deck equipment and machinery	IMO Reference

3.1.4 KNOWLEDGE OF HOISTING AND DIPPING FLAGS AND THE MAIN SINGLE-FLAG SIGNALS. (A, B, G, H, O, P, Q)

IMO references:R1, R2, R6
Teaching aids:
Textbooks: T1, T3, T5, T7, T10, T12, T14, T15, T16, T17
CDs and DVDs:

Required Performance:

4.1 Demonstrate knowledge and understanding of hoisting and dipping of flags and the main single flag signals (A, B, G, H, O, P, Q) (2 hours)

- Demonstrates the hoisting of a flag
- Recognizes and states the meaning of the main single flag signals
- Is able to dip the national flag upon order

COMPETENCE 3.2	Apply Occupational Health and Safety Precautions	IMO Reference

TRAINING OUTCOMES: STCW Code Table A-II/5

Demonstrates a knowledge and understanding of:

3.2.1 SAFE WORKING PRACTICES AND PERSONAL SHIPBOARD SAFETY

COMPETENCE 3.2	Apply Occupational Health and Safety Precautions	IMO Reference

3.2.1 SAFE WORKING PRACTICES AND PERSONAL SHIPBOARD SAFETY

IMO references: R1; R2, R9, R10, R34, R36, R37, R38
Teaching aids: A29, A31
Textbooks: T3, T5, T7, T9, T12, T14, T15, T16, T17
DVDs and CBTs: V10, V11, V12

Required Performance:

1.1 Demonstrates safe working practices and personal shipboard safety during working aloft and over the side (6 hours)

- Has working knowledge of safe working practices in working aloft including the use of ladders
- Has working knowledge of safe working practices in working over the side
- Uses the respective additional safety equipment

1.2 Demonstrates safe working practices and personal shipboard safety during working in enclosed spaces (2 hours)

- Explains the term enclosed space into detail
- Identifies typical enclosed spaces and potentially dangerous spaces on board
- Knows that on each ship a certain safety procedure with regard to entry into enclosed spaces has to be followed strictly and that responsibilities are defined clearly
- Has working knowledge of safe working practices with regard to the entry into an enclosed space
- Has working knowledge of working with breathing apparatus

1.3 Demonstrates knowledge and understanding of the application of permit to work systems (1 hours)

- Explains the need for typical permit-to-work systems that are used on board
- Explains the term risk assessment
- Knows that on each ship a certain safety procedures have to be followed strictly
- Has working knowledge of construction, classification, visual and function checking and use of additional protective equipment
- Knows the importance that any failure, damage or malfunction of safety and protective equipment has to be reported to Officer in Charge immediately

1.4 Demonstrates safe working practices and personal shipboard safety during line handling (3 hour)

- Has working knowledge of safe practices in line handling and involved risks
- Understands the hand signs and commands used during line handling

1.5 Demonstrates safe working practices and personal shipboard safety when applying lifting techniques and methods of preventing back injury (1 hour)

- Applies safe working practices in manual lifting and carrying
- Demonstrates correct manual handling techniques

1.6 Demonstrates working knowledge of electrical safety (6 hours)

- Understands the harmful effects of direct and alternating current on human's heart and body functions
- Explains and applies the Five Safety Rules
- Has working knowledge of the function principles of electric power operated tools and equipment
- Has working knowledge of safe working practices in using electric power operated tools and equipment
- Has working knowledge of the function principle of portable electric tools, portable lighting and portable electric equipment together with associated risks
- Understands that for certain tasks portable lighting with safety extra-low voltage has to be used
- Is able to perform basic visual and function checks electric power operated tools, electric lighting and electric equipment
- Knows the importance that any failure, damage or malfunction of electric power operated tools, electric lighting and electric equipment has to be reported to Officer in Charge immediately

1.7 Demonstrates working knowledge of mechanical safety (4 hours)

- Has working knowledge of the function principles of mechanical tools and mechanical equipment
- Has working knowledge of safe working practices in using mechanical tools and mechanical equipment
- Understands risks associated with hydraulic and pneumatically operated mechanical tools and mechanical equipment

1.8 Demonstrates working knowledge of chemical and biohazard safety (2 hours)

- Understands product details and potential hazards are found in suppliers' safety data sheet
- Understands how to comply with health, hygiene and safety requirements when handling hazardous substances
- Knows how to follow instruction and precautions when working with cleaning fluids, paints, toxic materials etc.
- Knows that additional personal protective equipment has be used
- Seeks advice if unsure of risks or hazards of materials

1.9 Demonstrate knowledge and understanding of the importance of personal protective equipment (2 hours)

- Has working knowledge of construction, material, classification, marking, visual and function checking and use of personal protective equipment
- Knows that personal protective equipment has to be used
- Knows the importance that any failure, damage or malfunction of personal protective equipment has to be reported to Officer in Charge immediately
- Recognizes and understands the meaning of prohibition, warning, mandatory and emergency safety and signage

1.10 Is able to communicate with other persons on board on elementary safety matters (1,5 hours)
See Entry Standards

- has completed basic safety training successfully
- has completed security related training successfully
- understands the information and instructions of superiors and colleagues

1.11 Is able to understand safety Information symbols, signs and alarm signals (1,5 hours)
See Entry Standards

- has completed basic safety training successfully
- has completed security related training successfully
- understands the information and instructions of superiors and colleagues
- understands Safety Information Symbols, Signs and Alarm Signals and is able to respond appropriately

COMPETENCE 3.3	Apply precautions and contribute to the prevention of pollution of the marine environment	IMO Reference

TRAINING OUTCOMES: STCW Code Table A-II/5

Demonstrates a knowledge and understanding of:

3.3.1 KNOWLEDGE OF THE PRECAUTIONS TO BE TAKEN TO PREVENT POLLUTION OF THE MARINE ENVIRONMENT

3.3.2 KNOWLEDGE OF THE USE AND OPERATION OF ANTI-POLLUTION EQUIPMENT

3.3.3 KNOWLEDGE OF THE APPROVED METHODS FOR DISPOSAL OF MARINE POLLUTANTS

COMPETENCE 3.3	Apply precautions and contribute to the prevention of pollution of the marine environment	IMO Reference

3.3.1 KNOWLEDGE OF THE PRECAUTIONS TO BE TAKEN TO PREVENT POLLUTION OF THE MARINE ENVIRONMENT

IMO references: R1, R2, R4, R34
Teaching aids: A29
Textbooks: T3, T9, T14, T15, T16, T17
DVDs and CBTs: V8, V9, V13, V14

Required Performance:

1.1 Basic knowledge of MARPOL 73/78 (4 hours)

- Explains the need that the marine environment has to be protected
- Understands that marine pollutants must be landed ashore for safe disposal in compliance with MARPOL
- Understands that there are strict rules covering disposal of oily water mixture that are mandatory for all ships
- Understands that there are strict rules covering disposal of noxious liquid substances that are mandatory for all ships
- Understands that there are strict rules covering disposal of harmful substances in packaged form that are mandatory for all ships
- Understands that there are strict rules covering pollution prevention by sewage that are mandatory for all ships
- Understands that there are strict rules covering pollution prevention by garbage that are mandatory for all ships
- Understands that there are strict rules covering air pollution from ships that are mandatory for all ships

1.2 Proactive measures to protect the marine environment (4 hours)

- Has working knowledge of using of deck scuppers for bunkering purposes
- Has working knowledge of assistance during bunkering operations
- Has working knowledge of use of emergency stop during bunkering
- Seeks advice if unsure of measures to be taken

COMPETENCE 3.3	Apply precautions and contribute to the prevention of pollution of the marine environment	IMO Reference

3.3.2 KNOWLEDGE OF THE USE AND OPERATION OF ANTI-POLLUTION EQUIPMENT

IMO references: R1, R2, R4, R8, R9, R10, R28, R34
Teaching aids: A29
Textbooks: T3, T9, T14, T15, T16, T17
DVDs and CBTs: V8, V9, V13, V14

Required Performance:

2.1 Operating procedures of anti-pollution equipment (4 hours)

- Has working knowledge of emergency response exercises for controlling spillage of oil on board
- Has working knowledge of drills for clean-up of hazardous cargo spillage
- Has working knowledge of operating garbage compactor unit (where fitted)

COMPETENCE 3.3	Apply precautions and contribute to the prevention of pollution of the marine environment	IMO Reference

3.3.3. KNOWLEDGE OF THE APPROVED METHODS FOR DISPOSAL OF MARINE POLLUTANTS

IMO references: R1, R2, R4, R8, R9, R10, R28, R34
Teaching aids: A29
Textbooks: T3, T9, T14, T15, T16, T17
DVDs and CBTs: V8, V9, V13, V14

Required Performance:

3.2 Disposal of Garbage (4 hours)

- Has working knowledge of collecting and segregating waste and garbage
- Has working knowledge of collecting and disposing of cargo sweepings
- Understands the need to segregate waste, record amounts and land ashore for disposal

3.4 Exchange of ballast water (2 hours)

- Has working knowledge of ballast water management methods
- Has working knowledge of ballast water treatment
- Has working knowledge of sediment management
- Has working knowledge of ballast water isolation

COMPETENCE 3.4	Operate survival craft and rescue boats	IMO Reference

TRAINING OUTCOMES: STCW Code Table A-II/5

Demonstrates a knowledge and understanding of:

3.4.1 KNOWLEDGE OF THE OPERATION OF SURVIVAL CRAFT AND RESCUE BOATS, THEIR LAUNCHING APPLIANCES AND ARRANGEMENTS, AND THEIR EQUIPMENT

3.4.2 KNOWLEDGE OF SURVIVAL AT SEA TECHNIQUES

See the requirements of STCW Code, Table A-VI/2-1 for Competence in Survival Craft and Rescue Boats other than Fast Rescue Boats and IMO Model Course 1.23 for related guidance.

Part D3: Instructor manual

The following notes are intended to highlight the main objectives or training outcomes of each part of the function. The notes also contain some material on topics which are not adequately covered in the quoted references.

Trainees will be aware of the need and the practical measures required to perform the following aspect of shipboard operations.

- Contribute to the safe operation of deck equipment and machinery
- Apply occupational health and safety precautions
- Apply precautions and contribute to the prevention of pollution of the marine environment
- Operate survival craft and rescue boats

Function 3: Controlling the Operation of the Ship and Care for Persons on Board at the Support Level

In implementing the section of this course the instructor should ensure that the trainees have prior and adequate training and experience as ratings forming part of a navigational watch and have demonstrated the ability to perform tasks as required of ratings.

In addition to the task description the following aspects are important within the framework of the training:

- Relevant norms and legal provisions as well as work safety regulations have to be applied also where they are not explicitly mentioned.
- During the training a specific focus is placed on the safety of the ship, work safety, health protection, and first-aid measures.
- Environmental protection and the efficient use of energy and materials as well as the communication during the ship's operation and nautical terminology is to be imparted as part of the learn areas in an integral manner.

On completion of training for this function trainees will be able to safely and efficiently operate deck equipment and machineries.

The trainees will be able to identify occupational hazards and take appropriate measures and precautions. They possess adequate working knowledge prior undertaking shipboard operations such as working aloft, working over the side and especially working in enclosed spaces. Working permits and proper working techniques shall be applied where appropriate.

They will be aware of the need and the practical measures required by law to prevent pollution of the environment. They will be able to demonstrate the proper use and operation of anti-pollution equipment and know the approved methods for disposal of marine pollutants

Training concerned with proficiency in survival craft and rescue boats other than fast rescue boats is covered in IMO model course 1.23.

3.1 Contribute to the safe operation of deck equipment and machinery

The ship's safety management system should provide safe practices in ship operation and a safe working environment, with safeguards against all identified risks in compliance with the ISM Code.

In addition, deck equipment and machinery should be:

- suitable for the work to be carried out
- properly adapted for that purpose; and
- capable of being operated without any risks to the health or safety of any worker

3.1.1 Knowledge of deck equipment

The instructor should explain to the trainees what is plan maintenance schedule and the tests that are conducted during the routine and periodical inspections and surveys.

3.1.1.1 Function and uses of valves and pumps, hoists, cranes, booms and related equipment

The trainees should be made aware of the different types and the respective functions of valves and pumps that are commonly used for the different shipboard operation. Amongst the different types of pump that may be used for shipboard operations are centrifugal pumps, propeller pumps, reciprocating pumps, positive displacement rotary pumps, jet pumps and eductors and air ejectors. The trainees should be familiar with the pipeline systems, the bilge locations, ballast suctions and wells.

During the practical aspect of training, the instructor should emphasized on the trainees the safe operation and procedures to follow so that the optimum level of results can be obtained.

The instructor shall explain and demonstrate to the trainees the proper procedures of operating the lifting gears and associated machineries on deck. The lifting gears and machineries should be operated in accordance with established safety practices as laid down in COSWP and the relevant operating instructions.

3.1.1.2 Function and uses of winches, windlasses, capstans and related equipment

Instructors should refer to references for further guidance on this topic.

3.1.1.3 Hatches, watertight doors, ports and related equipment

The trainees should be made aware of the importance of maintaining watertight and weathertight integrity of the ship as many incidents of ship capsizing and sinking are due to flooding of ships' cargo spaces resulting in loss of ship stability. All hatches, side/bow/stern doors and portholes especially those below the main deck of the ship have to closed watertight/weathertight before departure and maintain such throughout the voyage. Operation of these equipment and fittings should be in accordance with the manufacturers' manuals.

3.1.1.4 Fibre and wire ropes, cables and chains including their construction, use, markings, maintenance and proper stowage

Instructors should refer to references for further guidance on this topic.

3.1.1.5 Ability to use and understand basic signals for the operation of equipment, including winches, windlasses, cranes, and hoists

The instructor should stress to the trainees that there must be clear understanding between the winch operator and the signalman regarding the type and meaning of the signals used. At the end of this aspect of the training, the trainees should be able to use and understand basic signals for the operation of equipment and machineries including winches, windlasses, cranes and hoists.

3.1.1.6 Ability to operate anchoring equipment under various conditions, such as anchoring, weighing anchor, securing for sea and in emergencies

Instructors should refer to references for further guidance on this topic.

3.1.2.1 Knowledge and ability to rig bosun's chair and staging

Instructors should refer to references for further guidance on this topic.

3.1.2.2 Knowledge and ability to rig and unrig pilot ladders, hoists, rat guards and gangways

The instructor shall explain and demonstrate to the trainees the proper method for rigging and unrigging of bosun's chairs and staging, pilot ladders and hoist, gangways and rat guards. The demonstration should be carried out in accordance with safe industry practices.

3.1.2.3 Knowledge and ability to use marlin spike seamanship skills, including the proper use of knots, splices and stoppers

The instructor shall demonstrate the proper creation and use of knots, splices, stoppers, whippings and the likes including the proper handling and use of appropriate seamanship tools such as marlin spike and mallet.

3.1.3 Use and handling of deck and cargo-handling gear and equipment

Instructors should refer to references for further guidance on this topic.

3.1.3.1 Access arrangements, hatches and hatch covers, ramps, side/ bow/stern doors or freight elevators

3.1.3.2 Pipeline systems – bilge and ballast suctions and wells

3.1.3.3 Cranes, derricks, winches

3.1.4.1 Demonstrate knowledge and understanding of hoisting and dipping of flags and the main single flag signals (A, B, G, H, O, P, Q)

As a minimum knowledge of hoisting and dipping flag signals, the trainees shall know the meaning and the occasions of the single-flag signals, A, B, G, H, O P and Q.

Trainees should make themselves familiar with the meaning of main single-flag signals. Information can be adapted from the International Code of Signals (ICS, 1999).

3.2 Apply occupational health and safety precautions

With respect to health and safety of crew members working on board ship, employer, ship owner, company and ship manager alike, must ensure the following:

- Avoidance of risk which, amongst other things, replacement of dangerous practices, substances or equipment with safe practices and using less dangerous substances and equipment.
- Adaptation of work patterns and procedures taking into account the capacity of crew members, the equipment available and the prevailing circumstances during which the task is undertaken.

3.2.1 Safe working practices and personal shipboard safety.

The instructor shall stress that trainees are required to take reasonable care for their own health and safety and that of others on board who may be affected by their acts or omissions. They must carry out health and safety duties to the best of their capabilities. Proper use and operation of plant and machinery must be strictly observed and adhered to and hazards and deficiencies identified must be reported immediately.

In all instances without fail, risks to the health and safety of workers must be identified and assessed. It will often not be possible to remove all risks, but attention shall be given to control measures which make the working environment and working methods as safe as reasonably practicable.

The code of safe working practices for merchant seamen (COSWP) T15 describes safe working practices and personal shipboard safety including:

3.2.1.1 Working aloft and over the side

3.2.1.2 Working in enclosed spaces

3.2.1.3 Permit to work system

Such as:

- hot work permit
- cold work permit
- entry in enclosed space pemit
- working aloft permit
- working overside permit
- electrical isolation permit

3.2.1.4 Line handling

3.2.1.5 Lifting techniques and methods of preventing back injury

3.2.1.6 Electrical safety

3.2.1.7 Mechanical safety

3.2.1.8 Chemical and biohazard safety

3.2.1.9 Personal safety equipment

3.2.1.10 Is able to communicate with other persons on board on elementary safety matters

Instructors should refer to references for further guidance on this topic.

3.2.1.11 Is able to understand safety Information symbols, signs and alarm signals

Instructors should refer to references for further guidance on this topic.

3.3 Apply precautions and contribute to the prevention of pollution of the marine environment

This section is intended to provide general knowledge of the MARPOL Convention. In the following sections, detailed treatment should be confined to general guidelines and precaution to be taken in the prevention of pollution of the marine environment including the equipment and methods used for the disposal of marine pollutants relevant for the deck department.

Further information is covered by the IMO model course 1.38 Marine Environmental Awareness

3.3.1 Knowledge of the Precautions to be taken to prevent Pollution of the Marine Environment

3.3.1.1 Basic knowledge of MARPOL 73/78

The international nature of the shipping industry requires the prevention of marine pollution to be adopted and carried out at an international level rather by individual countries. As such, the International Maritime Organization (IMO) has laid down rules and requirements pertaining to these issues and they are incorporated in the International Convention for the Prevention of Pollution from Ships (MARPOL) Because of this fine balance that exist between the environment and ourselves, careless and deliberate pollution of the atmosphere and sea will ultimately destroy not only the animals, plants and sea life but also Mankind. It is therefore important that all efforts should be made to minimize the pollutions into the environments.

The technical annexes of MARPOL set out the rules for the construction and equipment of ships and for ships' operations which may result in marine pollution.

Sources of pollution:

- Annex (1): Prevention of pollution by **OIL**
- Annex (2): Control of pollution by **noxious liquid** substances in bulk

- Annex (3): Prevention of pollution by **harmful substances** carried by sea in packaged form
- Annex (4): Prevention of pollution by **SEWAGE** from ships
- Annex (5): Prevention of pollution by **GARBAGE** from ship
- Annex (6): Prevention of **AIR** pollution from ships

3.3.1.2 Proactive measures to protect the marine environment

The goal is to develop a 'way of thinking' and a sense of personal responsibility through:

- knowledge and comprehension of the importance and diversity of the marine environment
- recognition of the impacts of human activities on this environment and
- willingness to use solutions that lessen the impact

Instructor should list or request the trainees to identify the pollutants that are commonly found on board ship and within the shipping environment.

Preventative measures to protect the marine environment may include:

- Prevention of spillage of cargo
- Prevention of spillage of fuel and oil
- Control of polluting emission of gas and smoke
- Policies and practices to minimize the spread and carriage of marine pests
- Effective management of waste pollution and recycling processes
- Effective management of ballast operations
- Shipboard housekeeping
- Measures to prevent runoff during slipping operations
- Pollution control instructions

3.3.2 Knowledge of the use and operation of anti-pollution equipment

3.3.2.1 Operating procedures of anti-pollution equipment

The instructor shall give an overview of the anti-pollution equipment used on board ships but stress on the equipment used in the deck department.

3.3.3 Knowledge of the approved methods for disposal of marine pollutants

In all the circumstances, be it incinerating, treating, dumping and disposal ashore, proper and accurate record of the respective activities should be maintained.

The instructor shall impress on the trainees the occasions and the types of waste that are allowed to be dump.

3.3.3.1 Disposal of Garbage

Instructors should teach trainees, taking into account the relevant parts of MARPOL 73/78, Annex V

3.3.3.2 Exchange of ballast water

Instructors should teach trainees, taking into account the relevant parts of the Ballast Water Management Convention 2004

3.4 Operate survival craft and rescue boats

The requirements of the STCW Convention are fully covered by IMO model course 1.23, Proficiency in Survival Craft and Rescue Boats other than Fast Rescue Boats, which is based on the requirements of the STCW Convention. Trainees who have successfully completed that course and have been issued with a certificate of proficiency in survival craft have demonstrated the ability and knowledge necessary to satisfy the requirements of the regulations.

Rating as able seafarer deck
Function 4
Maintenance and Repair at the Support Level

Rating as able seafarer deck
Function 4: Maintenance and Repair at the Support Level

INDEX

Part B4: Course Outline

Timetable

No formal example of a timetable is included in this model course.

Development of a detailed timetable depends on the level of skills of the trainees entering the course and the amount of revision work of basic principles that may be required.

Lecturers must develop their own timetable depending on:

- the level of skills of trainees
- the numbers to be trained
- the number of instructors

and normal practices at the training establishment.

Preparation and planning constitute an important factor which makes a major contribution to the effective presentation of any course of instruction.

Lectures

As far as possible, lectures should be presented within a familiar context and should make use of practical examples. They should be well illustrated with diagrams, photographs and charts where appropriate, and be related to matter learned during seagoing time.

An effective manner of presentation is to develop a technique of giving information and then reinforcing it. For example, first tell the trainees briefly what you are going to present to them; then cover the topic in detail; and, finally, summarise what you have told them. The appropriate use of teaching aids such as multimedia equipment and presentation slides and providing trainees with adequate course materials will contribute very much in the teaching and learning processes.

Course Outline

The tables that follow list the competencies and areas of knowledge, understanding and proficiency, together with the estimated total hours required for lectures and practical exercises. Teaching staff should note that timings are suggestions only and should be adapted to suit individual groups of trainees depending on their experience, ability, equipment and staff available for training.

COURSE OUTLINE

4.

Knowledge, understanding and proficiency	Total hours for each topic	Total hours for each subject area of required performance
Competence:		
4.1. CONTRIBUTE TO SHIPBOARD MAINTENANCE AND REPAIR		
4.1.1. KNOWLEDGE OF SURFACE PREPARATION TECHNIQUES		(6 hours)
.1 Prepare steel for coating	(6 hours)	
4.1.2. ABILITY TO USE PAINTING, LUBRICATION AND CLEANING MATERIALS AND EQUIPMENT		(16 hours)
.1 Clean and maintain paintwork and deck surfaces	(2 hour)	
.2 Use of rust removers	(1 hours)	
.3 Understands different coating sequences	(2 hours)	
.4 Prepare and apply paint or protective coatings	(8 hours)	
.5 Lubricate and grease moving parts on deck	(2 hours)	
.6 Lubricate wires	(1 hour)	
4.1.3. ABILITY TO UNDERSTAND AND EXECUTE ROUTINE MAINTENANCE AND REPAIR PROCEDURES		(8 hours)
.1 Understand maintenance schedules and maintain equipment on deck	(4 hours)	
.2 Select and use correct fluids, lubricants or grease	(1 hour)	
.3 Join and secure components	(2 hours)	
.4 Stow equipment and leave working areas clean, tidy and safe	(1 hour)	
4.1.4. UNDRSTANDING MANUFACTURER'S SAFETY GUIDELINES AND SHIPBOARD INSTRUCTIONS		(8 hours)
.1 Understand typical shipboard safety regulations	(4 hours)	
.2 Use personal protective equipment	(2 hours)	
.3 Use of chemicals on board	(1 hour)	
.4 Ventilate interior and enclosed spaces during and after painting	(1 hour)	
4.1.5. KNOWLEDGE OF SAFE DISPOSAL OF WASTE		(4 hours)

	MATERIALS		
	.1 Understand there are strict rules for the prevention of pollution covering disposal at sea applicable to all ships	(2 hours)	
	.2 Follow correct procedures for disposal of paint residues, solvents, sweepings and other chemicals in use	(1 hour)	
	.3 Operate waste handling equipment as required	(1 hour)	
4.1.6.	KNOWLEDGE OF THE APPLICATION, MAINTENANCE AND USE OF HAND AND POWER TOOLS		(58 hours)
	.1 Correct use of equipment	(4 hours)	
	.2 Select appropriate measuring equipment and understand how it is used	(4 hours)	
	.3 Select correct hand or power tools	(26 hours)	
	.4 Use of welding equipment for temporary and simple repair work on deck	(24 hours)	

Total for Function 4: Maintenance and Repair at the Support Level 100 hours

Teaching staff should note that the hours for lectures and exercises are suggestions only as regards sequence and length of time allocated to each objective. These factors may be adapted by lecturers to suit individual groups of trainees depending on their experience, ability, equipment and staff available for teaching.

Part C4: Detailed Teaching Syllabus

Introduction

The detailed teaching syllabus is presented as a series of learning objectives. The objective, therefore, describes what the trainee must do to demonstrate that the specified knowledge or skill has been transferred.

Thus each training outcome is supported by a number of related performance elements in which the trainee is required to be proficient. The teaching syllabus shows the *required performance* expected of the trainee in the tables that follow.

In order to assist the instructor, references are shown to indicate IMO references and publications, textbooks and teaching aids that instructors may wish to use in preparing and presenting their lessons.

The material listed in the course framework has been used to structure the detailed teaching syllabus; in particular,

Teaching aids (indicated by A)

IMO references (indicated by R) and

Textbooks (indicated by T)

CDs and DVDs (indicated by V)

which will provide valuable information to instructors.

Explanation of Information Contained in the Syllabus Tables

The information on each table is systematically organized in the following way. The table describes the FUNCTION with which the training is concerned. A function means a group of tasks, duties and responsibilities as specified in the STCW Code. It describes related activities which make up a professional discipline or task responsibility on board.

In this Model Course there are four functions:

Function 1: Navigation at the Support Level

Function 2: Cargo Handling and Stowage at the Support Level

Function 3: Controlling the Operation of the Ship and Care for Persons on Board at the Support Level.

Function 4: Maintenance and repair at the support level

The first column denotes the COMPETENCE concerned. Each function comprises several competences. For example, the Function 4, Maintenance and repair at the support level, comprises a single COMPETENCE. Each competence is uniquely and consistently numbered in this model course.

The term competence should be understood as the application of knowledge, understanding, proficiency, skills, and experience for an individual to perform a task, duty or responsibility on board in a safe, efficient and timely manner.

Shown next is the required TRAINING OUTCOME. The training outcomes are the areas of knowledge, understanding and proficiency in which the trainee must be able to demonstrate knowledge and understanding. Each COMPETENCE comprises a

number of training outcomes. For example, the above competence comprises six training outcomes. Each training outcome is uniquely and consistently numbered in this model course.

Finally, each training outcome embodies a variable number of required performances - as evidence of competence. The instruction, training and learning should lead to the trainee meeting the specified required performance. For the training outcome concerned with knowledge of surface preparation and painting techniques there are six areas of performance.

Following each numbered area of required performance there is a list of activities that the trainee should complete and which collectively specify the standard of competence that the trainee must meet. These are for the guidance of instructors in designing lessons, lectures, tests and exercises for use in the teaching process.

IMO references (Rx) are listed in the column to the right hand side. Teaching aids (Ax), and textbooks (Tx) relevant to the training outcome and required performances are placed immediately following the title.

It is not intended that lessons are organised to follow the sequence of required performances listed in the Tables. The Syllabus Tables are organised to match with the competence in the STCW Code Table A-II/5. What is necessary is that all the material is covered and that teaching is effective to allow trainees to meet the standard of the required performance.

COMPETENCE 4.1	Contribute to shipboard maintenance and repair	IMO Reference

TRAINING OUTCOMES: STCW Code Table A-II/5

Demonstrates a knowledge and understanding of:

4.1.1 KNOWLEDGE OF SURFACE PREPARATION TECHNIQUES

4.1.2 ABILITY TO USE PAINTING, LUBRICATION AND CLEANING MATERIALS AND EQUIPMENT

4.1.3 ABILITY TO UNDERSTAND AND EXECUTE ROUTINE MAINTENANCE AND REPAIR PROCEDURES

4.1.4 UNDERSTANDING MANUFACTURER'S SAFETY GUIDELINES AND SHIPBOARD INSTRUCTIONS

4.1.5 KNOWLEDGE OF SAFE DISPOSAL OF WASTE MATERIALS

4.1.6 KNOWLEDGE OF THE APPLICATION, MAINTENANCE AND USE OF HAND AND POWER TOOLS

COMPETENCE 4.1	Contribute to shipboard maintenance and repair	IMO Reference

4.1.1 KNOWLEDGE OF SURFACE PREPARATION TECHNIQUES

IMO references: R1, R2, R4, R29, R34, R38
Teaching aids: A1, A29, A31
Textbooks: T3, T5, T7, T12, T14, T15, T16, T17

“Surface Preparation: Metallic Surfaces” prepared by International Paint Ltd.
http://www.international-pc.com/resource-centre/documents/surface-preparation.pdf

“Paint Application” prepared by International Paint Ltd.
http://www.international-pc.com/resource-centre/documents/paint-application.pdf

“Onboard Maintenance Painting Guide” prepared by AkzoNobel.
http://www.international-marine.com/Literature/Onboard%20Maintenance%20Painting%20Guide.pdf

Required Performance:

1.1 Prepare steel for coating (6 hours)

- Understands the importance of proper surface preparation for coating
- Understands the function of the tools used for surface preparation from manual chipping hammer up to powered scaling equipment
- Carries out the maintenance of the tools used for surface preparation
- Has working knowledge of the use of the tools used for surface preparation
- Uses personal protective equipment

COMPETENCE 4.1	Contribute to shipboard maintenance and repair	IMO Reference

4.1.2 ABILITY TO USE PAINTING, LUBRICATION AND CLEANING MATERIALS AND EQUIPMENT

IMO references: R1, R2, R4, R29, R34, R38
Teaching aids: A1, A29, A31
Textbooks: T3, T5, T7, T12, T14, T15, T16, T17

Required Performance:

2.1 Clean and maintain paintwork and deck surfaces (2 hours)

- understands that cleaning and degreasing agents are harmful and may be corrosive
- reads and understands product data sheets and uses PPE
- has basic knowledge of cleaning and maintenance of paintwork and deck surfaces

2.2 Use of rust removers (1 hour)

- understands that rust removers are harmful, acidic and corrosive
- Understands the properties of the chemicals
- reads and understands product data sheets and strictly follows the instructions
- uses PPE with additional and eye and skin protection

2.3 Understand different coating sequences (2 hours)

- Has basic knowledge of different coating sequences
- Understands the importance of following manufacturers' instructions

2.4 Prepare and apply paint or protective coatings (8 hours)

- Understands the importance of preparing the paint before application
- Has working knowledge of brush application
- Has working knowledge of roller application
- Has working knowledge of spray application
- Has basic working knowledge of applying paint
- Knows that certain parts on deck may not be painted

2.5 Lubricate and grease moving parts on deck (2 hours)

- Has working knowledge of lubricating of e.g. windlass, winches, blocks, chocks
- Knows that certain blocks may not be greased

2.6 Lubricate wires (1 hour)

- Has working knowledge of lubricating of e.g. lifeboat falls, crane wires, winch runners and mooring wires
- Knows that certain blocks may not be painted or greased

COMPETENCE 4.1	Contribute to shipboard maintenance and repair	IMO Reference

4.1.3 ABILITY TO UNDERSTAND AND EXECUTE ROUTINE MAINTENANCE AND REPAIR PROCEDURES

IMO references: R1, R2, R4, R29, R34, R38
Teaching aids: A1, A29, A31
Textbooks: T3, T5, T7, T12, T14, T15, T16, T17

Required Performance:

3.1 Understand maintenance schedules and maintain equipment on deck (4 hours)

- Is familiar with the different schedules applicable tor inspection, lubrication and overhaul of lifting and mechanical equipment
- Executes visual inspection before using equipment
- Has knowledge of procedures for testing of lifting appliances and mechanical equipment
- analyses assembly drawings, general arrangement drawings and parts lists
- informs themselves about the assembly and function of the machines
- has knowledge of the relevant systems of tolerances and fits
- selects and uses the machines and tools according to the task considering functional and technological criteria
- selects materials (ferrous metals, non-ferrous metals, and plastics) and auxiliary materials considering their specific characteristics and assign them to the respective components
- executes work steps including cutting and welding and assesses the work results.

3.2 Select and use correct fluids, lubricants or grease (1 hour)

- Has basic knowledge of selecting and using correct fluids, lubricants or grease
- Knows typical lubrication plans
- Has working knowledge of selecting and using grease gun or lubricating equipment

3.3 Join and secure components (2 hours)

- Has basic knowledge of securing components with screws, nuts and locking elements
- Understands that material and strength of screws and nuts have to be selected as necessary
- Has knowledge of the use of torque wrenches
- Is familiar with the maintenance of threads

3.4 Stow equipment and leave working areas clean, tidy and safe (1 hours)

- Has basic knowledge of stowing equipment and clean up working site on completion of work.

COMPETENCE 4.1	Contribute to shipboard maintenance and repair	IMO Reference

4.1.4 UNDERSTANDING MANUFACTURER'S SAFETY GUIDELINES AND SHIPBOARD INSTRUCTIONS

IMO references: R1, R2, R4, R29, R33, R34, R38
Teaching aids: A1, A29, A31
Textbooks: T3, T5, T7, T12, T14, T15, T16, T17

Required Performance:

4.1 Understand typical shipboard safety regulations (4 hours)

- Is familiar with safety guidelines on board
- Has knowledge of ship's permit to work system
- Is familiar with enclosed space entry routines

4.2 Use personal protective equipment (2 hours)

- Is familiar with personal protective equipment and its standards
- Understands the need to use the correct personal protective equipment
- Has knowledge of choosing the correct personal protective equipment

4.3 Use of chemicals on board (1 hour)

- Understands that paints may contain toxic or irritant substances and their hazards
- Understands that chemicals may give rise to flammable and potentially explosive vapours
- Stows the chemicals on board as necessary
- reads and understands product data sheets and uses PPE

4.4 Ventilate interior and enclosed spaces during and after painting (1 hour)

- Understands the importance of ventilation of interior spaces during and after painting
- Understands the importance of ventilation of enclosed spaces during and after painting with special regard to the enclosed spaces procedures on board
- Chooses and installs portable ventilation with regard to safety

COMPETENCE 4.1	Contribute to shipboard maintenance and repair	IMO Reference

4.1.5 KNOWLEDGE OF SAFE DISPOSAL OF WASTE MATERIALS

IMO references: R1, R2, R4, R29, R33, R34, R38
Teaching aids: A1, A29, A31
Textbooks: T3, T5, T7, T12, T14, T15, T16, T17

Required Performance:

5.1 Understand there are strict rules for the prevention of pollution covering disposal at sea applicable to all ships (2 hours)

- Is familiar with the rules for disposal of waste materials
- Plans the proper disposal of defective parts and used-up auxiliary materials, considering the regulations concerning environment protection (recycling).

5.2 Follow correct procedures for disposal of paint residues, solvents, sweepings and other chemicals in use (1 hours)

- Is familiar with the correct procedures for disposal of waste materials

5.3 Operate waste handling equipment as required (1 hours)

- Has basic knowledge of operating waste handling equipment
- Is familiar with the precautions

Further information is covered by the IMO model course 1.38 Marine Environmental Awareness

COMPETENCE 4.1	Contribute to shipboard maintenance and repair	IMO Reference

4.1.6 KNOWLEDGE OF THE APPLICATION, MAINTENANCE AND USE OF HAND AND POWER TOOLS

IMO references: R1, R2, R4, R29, R30, R33, R34, R38
Teaching aids: A1, A29, A31
Textbooks: T3, T5, T7, T12, T14, T15, T16, T17

Required Performance:

6.1 Correct use of equipment (4 hours)

- analyses assembly drawings, general arrangement drawings and parts lists
- informs themselves about the assembly and function of the machines
- selects and uses the machines and tools according to the task considering functional and technological criteria
- Understands that defective machines and tools must be taken out of use, marked and reported to the responsible officer

6.2 Use of measuring equipment (4 hours)

- Selects and uses appropriate measuring equipment
- develops assessment criteria (measurement errors), select test mediums and apply them and interpret test certificates
- has knowledge of the relevant systems of tolerances and fits

6.3 Select correct hand or power tools (26 hours)

- selects and uses the machines and tools according to the task considering functional and technological criteria
- selects and uses correct type of drill bit, cutting blade, abrasive wheel etc.
- Has working knowledge of safe working practices for using powered tools
- The trainees prepare the manufacture of components that are typical of their profession by means of hand-operated tools

6.4 Use of welding equipment for temporary and simple repair work on deck (24 hours)

- Has basic knowledge of correctly setting and operating welding equipment
- Is familiar with the safety precautions when operating welding equipment especially with regard to the prevention of fire

Part D4: Instructor manual

The following notes are intended to highlight the main objectives or training outcomes of each part of the function. The notes also contain some material on topics which are not adequately covered in the quoted references.

This function covers the theory and practice of maintenance and repair at the support level, including the knowledge and skill of:

- Surface preparation techniques
- Painting, lubrication and cleaning materials and equipment
- Routine maintenance and repair procedures
- Manufacturer's safety guidelines and shipboard instructions
- Safe disposal of waste materials
- Maintenance and use of hand and power tools

Function 4: Maintenance and Repair at the Support Level

In addition to the task description the following aspects are important within the framework of the training:

- Relevant norms and legal provisions as well as work safety regulations have to be applied also where they are not explicitly mentioned.
- During the training a specific focus is placed on the safety of the ship, work safety, health protection, and first-aid measures.
- Environmental protection and the efficient use of energy and materials as well as the communication during the ship's operation and nautical terminology is to be imparted as part of the learn areas in an integral manner.

On completion of training for this function trainees will be able to carry out safely and efficiently shipboard maintenance and repair.

They assume tasks as surface preparation by chipping and painting.

They master the maintenance of windlass, winches, blocks, chocks and other moving parts on deck, and the lubrication of lifeboat falls, crane wires, winch runners and mooring wires.

They execute routine maintenance and repair procedures.

They understand manufacturer's safety guidelines and shipboard instructions.

They operate waste handling equipment disposing waste materials.

They select and use the hand and power tools correctly. And maintain the hand and power tools.

4.1 Contribute to shipboard maintenance and repair

4.1.1 Knowledge of surface preparation techniques

4.1.1.1 Prepare steel for coating

Understanding the importance of proper surface preparation for coating

Proper surface preparation is essential for the success of any marine coating system. The performance of any paint coating is directly dependent upon the correct and thorough preparation of the surface prior to coating. The most expensive and technologically advanced coating system will fail if the surface preparation is incorrect or incomplete. The importance of removing oil, grease, old coatings, rust and other surface contaminants cannot be over stressed.

Having working knowledge of the tools used for surface preparation

Loosely adhering rust and old paint coatings may be removed from steel by hand wire brushing, sanding, scraping and chipping with wire brushes scrapers, chipping hammers etc. These methods are incomplete, and always leave a layer of tightly adhering rust on the steel surface. Power tool cleaning is generally more effective and less laborious than hand tool cleaning for the removal of loosely adhering paint and rust. However, power tool cleaning will not remove tightly adhering rust. Power wire brushes, impact tools (such as needle guns), grinders and sanders are all commonly used; the cutting actions of grinding discs would be the preferred choice.

Having knowledge of personal protective equipment

Many injuries are attributed to workers not wearing the proper protective clothing, when carrying out these duties. To expose the skin during chipping is also dangerous because rusts and pieces of irons might spread at high speed. Even if it is hot, wear long sleeve working wears. Always carefully read and completely follow the safety procedures and instructions recommended by manufacturers of surface preparation devices, application equipment, media or products and the job site safety measures. Most commonly used personal protective equipment includes:

- **Chipping goggles:** It is important to protect the eyes, especially for chipping work;
- **Dust mask:** It is used to prevent inhaling dust of a certain size, because the fine particles of 0.1 t0 5 micron in size are harmful to lungs, particularly when air hammer or air chisel is used;
- **Earplug:** It is for noise preventive purpose. Earmuff is one type of earplugs which covers the whole ears, wearing both earplug and earmuff is highly effective;
- **Vibration-proofing gloves:** Such gloves should always be worn when a vibrating device such as an air hammer is being used.

4.1.2 Ability to use painting, lubrication and cleaning materials and equipment

4.1.2.1 Clean and maintain paintwork and deck surfaces

Basic knowledge of cleaning and maintenance of paintwork and deck surfaces

The main purpose of marine paintwork is to protect the steel underneath. However, the paintwork itself should be protected in the first place. Impact and scratching would damage the physical structure of paintwork, scrubbing the surface or the use of an abrasive or strong cleaning agent also might burnish the paint surface and mar the paint finish, all of which should be avoided.

Basic knowledge of cleaning and degreasing agents

Cleaning agents are substances (usually liquids, powders or sprays) used to remove dirt, including dust, stains, bad smells, and clutter on surfaces. Some of the cleaning agents are of a corrosive nature, their usage should be avoided or limited.

4.1.2.2 Use of rust removers

Understand the properties of the chemicals

Since paints, including rust removers, generally employ solvents with a low flash point, they emit flammable vapors at ambient temperature, and are in a state which combustion is liable to occur at all times. The vapor of solvents is heavier than air and accumulates at deck level.

Solvents have a property to irritate the skin or mucous membranes, and cause headaches. They also cause intoxication. Since solvents dissolve fats, they may cause dry skins or dermatitis, with risk of burns to eyes, skin, and respiratory tract.

Working knowledge of protective measures

There are no adverse effects during normal usage of those chemicals. However, precautions must be taken into account, as follows:

- Avoid contact with eyes, skin or clothing. In case of contact, rinse the area for at least 15 minutes. Remove contaminated clothing and shoes, wash thoroughly before reuse. Get immediate medical attention if irritation persists.
- Ensure adequate ventilation. When ventilation is limited, wear an appropriate breathing apparatus in order to avoid breathing solvent fumes.
- Do not eat, drink, or smoke in work area. Wash hand thoroughly after use.
- Eye washers should be prepared with l% to 2% boric acid solution so that the painters can wash their eyes at any time if necessary. If some foreign matter gets into the eye it should be removed by washing, rubbing does not clear it away. If the injury is slight, blink your eye in water and use eye ointment.

4.1.2.3 Understand different coating sequences

Basic knowledge of coating sequences

In a typical protective paint coating sequence, three types of coatings are used: a primer, an intermediate coat, and a topcoat. Each coating ‘layer’ in any protective system has a specific function. Incorrect sequence of a paint coating will result in deteriorated protective function and reduced performance or complete failure of the paintwork.

Importance of following manufacturers’ instructions

Manufacturers require a specific coating sequence for some coatings. It should be ensured under such circumstance that proper product is used for different layer of coats, as instructed by the manufacturers.

4.1.1.4 Prepare and apply paint or protective coatings

Understanding the importance of preparing the paint before application

It is very important to prepare the paint to be applied. The following points should be observed before application of paint.

Painting amount	Calculate standard painting amount from painting area, and prepare paint and thinner.
Open the can	After checking the brand name, open the can just before starting. In order to avoid possible colour differences always use paints, on the same surface with an identical batch number, found on the bottom of each can.
Stir	Sufficiently stir in order to mix evenly pigment and resin which have been separated due to the difference in specific gravity. Avoid the intake of air into the paint by stirring too aggressively.
Adjustment of viscosity	Use a thinner dedicated to the paint. The paint performance is not guaranteed unless diluted within the permissible range.
Filtering	For spray painting, remove solids and skinning by a sieve to prevent the tip from clogging.

Having working knowledge of brush application

Application of paint by brush is recommended for patch priming and repair work to ensure good wetting of the substrate. This is essential when painting over manually prepared surfaces.

The choice of brush will depend upon the application required and the quality of finish to be achieved. Flat square end brushes, often called wall brushes, are used on flat areas, while angular cut ‘sash’ brushes are used on narrow surfaces, and round or elliptical section brushes are used on irregular shapes such as nuts and bolts. Brushes with angled heads and long handles are used for painting the backs of stiffening bars and other inaccessible areas in tanks.

Brushes should not be dipped into the paint more than half the length of their bristles, the aim is to load the brush with enough paint to get some work done, but not too much so the paint drips and splatters. The applied paint should spread evenly using smooth, steady strokes then be smoothed by light parallel strokes to eliminate irregularities. On flat, vertical surfaces, it is best to finally lay off the paint in a vertical direction because this will reduce the tendency of the paint to run or sag. Particular attention should be paid in ensuring that the applied paint is brushed into the bottom of pitted areas of steel and that the edges of nuts etc. are well coated.

Having working knowledge of roller application

Rollers are useful for applying paint to large flat areas such as tank tops, vertical sides, walkways and deck areas. Roller application requires less skill from painters than brush application. The most common roller fabrics used are lamb’s wool and mohair.

When applying paint, immerse the roller into the paint tray, roll it in the paint until fully saturated, and then roll it back and forth on the tray ramp to remove all excess material. This not only avoids the problems of drips and spatters, but ensures that the roller is fully wetted and that air is removed from the fibre pile. Pitted areas should be touched up by brush before roller application.

The following table gives a simple comparison between brush and roller paint application:

	Advantages	**Disadvantages**
Brush	Good for small, complex areas	They require more coats to achieve film thickness
	Inexpensive equipment	
	Minimal wastage	
Roller	Faster than brushing	They require more coats to achieve correct film thickness
	Good for large flat areas	Possibility of uneven film thickness

Having working knowledge of spray application

In spray application, the paint is atomized into fine droplets and projected onto the surface to be protected where the droplets join together to form a continuous film. The atomization can be accomplished in a number of ways.

In air spraying, the paint is atomized by mixing it with a stream of compressed air in a conventional spray gun. The paint can be either sucked into the air stream (as in the simple suction cup gun used for application to small areas) or fed to the spray gun under pressure from a pressure pot. For ideal application, careful adjustments of the spray nozzle and air pressures must be made by a skilled operator, according to the consistency and composition of the paint product and the film thickness required.

For airless spraying, the paint is hydraulically compressed and, on release through a small orifice in an airless spray gun, it is atomized and projected onto the surface. By changing the orifice size and shape and by varying the hydraulic pressure, atomization can be accomplished for a wide range of paint consistencies from thin to thick, to give a wide range of rates of deposition. The equipment required is much more expensive than for air-assisted spraying, because it must withstand the much higher pressures involved. For air-assisted spraying, the maximum air pressure will normally not exceed 690 kPa (100 psi); for airless spraying, hydraulic pressures of up to 27,500 kPa (4,000 psi) may be required.

After operation, the paint spraying equipment should be treated as follows:

- Wash the unit by circulating fresh thinner slowly for about 15 to 20 minutes;
- Remove the suction filter and material filter, and clean them;
- Wash the nozzle sufficiently in the thinner. If it is expected to be used within a few days, it should be soaked in thinner;
- When the system is not expected to be used for a long time, the valve ball of the material cylinder should be cleaned and oiled to prevent it from jamming.

Having basic working knowledge of applying paint

Never mix excessive thinner, otherwise, in the case of painting of walls, paint tends to drip and prohibits obtaining a thick coat.

Distribute the paint well and even, and avoid applying too heavy a film thickness causing through-drying problems and wrinkling. It is always better to apply two thin coats than one thick coat.

The painting sequence should be from the far side to the near side, from top to bottom and the complicated places should be painted first.

4.1.2.5 Lubricate and grease moving parts on deck

Working knowledge of lubricating moving parts of deck equipment

All weather deck equipment must be lubricated properly to ensure protection against wear and weather elements. All moving parts of the system must be working freely, and sufficiently greased or oiled. The maintenance and lubrication of heavy deck equipment, such as winches, cranes, and anchor windlasses, should be carried out regularly.

In order to maintain good work condition, windlasses, winches, blocks, chocks and other moving parts on deck need to be lubricated or greased periodically, as follows:

No.	Equipment	Maintenance	Frequency
1	windlasses	lubrication and grease	once a voyage
2	winches	lubrication and grease	once a voyage
3	blocks, tackles	lubrication and grease	three monthly
4	chocks, fairlead rollers	lubrication and grease	three monthly
5	all kinds of hinges	lubrication and grease	three monthly
6	ventilation equipment	lubrication and grease	three monthly

4.1.2.6 Lubricate wires

Working knowledge of lubricating the wires

Wire rope is a flexible, tough, complex, and versatile mechanical power transmission member made up of numerous individual wires. During normal operation these wires are subject to torsion, bending, tension, and compression stresses. To achieve maximum performance and life, lubrication of the wire rope structure must be maintained so that coordinated sliding action between individual wires permits most favorable distribution of these stresses. Good lubrication offers protection against corrosion and minimizes metal-to-metal contact between individual wires while reducing wear on the rope and on the drum and sheaves over which it operates.

All exposed wires must be covered with some surface coating for protection against the weather. Wire rope for running rigging, such as lifeboat falls, crane wires, winch runners and mooring wires, must be covered with a mixture that provides lubrication as well as protection against the weather. A preparation of graphite and grease makes an excellent covering for running wire if no prepared mixture is on hand.

4.1.3 Ability to understand and execute routine maintenance and repair procedures

4.1.3.1 Understand maintenance schedules and maintain equipment on deck

Vessel planned maintenance system is to be referred for schedules, requirements and other details. When the planned maintenance system indicates that a particular machine or item is due for attention, all routine maintenance such as greasing, testing etc. should be done.

Different schedules applicable tor inspection, lubrication and overhaul of lifting and mechanical equipment

Lifting and mechanical equipment should be lubricated each quarter. Overhaul should be conducted with the following different periods:

- 6-month period

It should be ensured that each chain, rope or lifting gear used for raising or lowering or as a means of suspension has been thoroughly examined by a competent examiner in the preceding 6 months before it is used.

- 12-month period

Lifting appliance should be thoroughly examined by a competent examiner at least once in the preceding 12 months. It is mandatory that a periodic thorough examination should be carried out by a competent examiner even if the lifting appliance or lifting gear is in serviceable and good condition. For certain lifting appliances, the period of examination is also defined by the manufacturer besides the legal requirement. Reference should be made to the operation and maintenance manual for any additional requirement.

Working knowledge of procedures for testing of lifting appliances and mechanical equipment

Every lifting appliances, together with its accessories, such as any derrick, gooseneck, eye-plate, eyebolt or other attachments, should be tested with a proof load which should exceed the safe working load as follows:

- If the safe working load is less than 20 tonnes, the proof load should exceed the safe working load by at least 25 percent.
- If the safe working load is 20 tonnes but not exceeding 50 tonnes, the proof load should exceed the safe working load by at least 5 tonnes.
- If the safe working load is more than 50 tonnes, the proof load should exceed the safe working load by at least 10 per cent.

The proof load should be applied either by hoisting movable weights or by means of a spring or hydraulic balance or a similar appliance. With a derrick at an angle to the horizontal which should be specified in the certificate of the test. During the test, the

derrick should be swung as far as practicable first in one direction and then in the other.

4.1.3.2 Select and use correct fluids, lubricants or grease

Basic knowledge of selecting and using correct fluids, lubricants or grease

When selecting and using correct fluids, lubricants or grease, the several factors should be taken into account, such as service temperature range, speed, extreme pressure, fretting etc. In general, the principle is to follow the instructions of manufacturers of the equipment to be lubricated or greased.

Working knowledge of selecting and using grease gun or lubricating equipment

A grease gun is a common tool used for lubrication. The purpose of the grease gun is to apply lubricant through an aperture to a specific point, usually on a grease fitting or 'nipple'. The channels behind the grease nipple lead to where the lubrication is needed. The aperture may be of a type that fits closely with a receiving aperture on any number of mechanical devices. The close fitting of the apertures ensures that lubricant is applied only where needed. The grease gun is charged or loaded with any of the various types of lubricants, but usually a thicker heavier type of grease is used.

Different types of grease guns demand different ways of operation:

- Hand-powered, where the grease is forced from the aperture by back-pressure built up by hand cranking the trigger mechanism of the gun, which applies pressure to a spring mechanism behind the lubricant, thus forcing grease through the aperture.
- Hand-powered, where there is no trigger mechanism, and the grease is forced through the aperture by the back-pressure built up by pushing on the butt of the grease gun, which slides a piston through the body of the tool, pumping grease out of the aperture.
- Air-powered (pneumatic), where compressed air is directed to the gun by hoses, the air pressure serving to force the grease through the aperture.

4.1.3.3 Join and secure components

Basic knowledge of securing components with screws, nuts and locking elements

All securing devices must be certified; if not, the reliability must be confirmed before application. When used in combination, the respective maximum securing load must be considered, and the minimum securing load serves as the load of the whole securing system.

Familiar with the maintenance of threads

Threads should be kept greased. Screw the securing cap on the plug tightly to the threaded sleeve on the receptacle to ensure full pin contact. Check thread conditions both in shaft and nuts and the locking arrangement for the nut. Inspect the thread at

the forward to make sure that there is no cracking or potential cracking. Check the nut and the locking arrangements to see that they are in order. Threads should be carefully examined for cracks, particularly at keyways.

4.1.3.4 Stow equipment and leave areas clean, tidy and safe

Basic knowledge of stowing equipment and clean up working site on completion of work

Keeping work places and tool stores in order is important not only for increasing work efficiency but also for preventing accidents. As a matter principle, the following should be observed on completion of work:

- Check that the work area is clear or clean up before leaving;
- Clear away waste materials safely;
- Check for slip/trip hazards;
- Check that tools are safe to use before returning them to the storage area or report defects for repair;
- Return safety equipment to the correct storage area;
- Protectors and detectors should be stored so that they can rapidly be used on emergency;
- Isolate power supplies when not in use to eliminate the risk of electric shock, fire, or equipment malfunction;
- Unnecessary facilities should be removed, and necessary goods disposed of, leaving the work area in a safe and tidy condition.

4.1.4 Manufacturer's safety guidelines and shipboard instructions

4.1.4.1 Understand typical shipboard safety regulations

Safety guidelines on board

There are various guidelines to provide safety guidance for personnel working on board which have been formulated by industry sectors, governments, manufacturers of shipboard equipment and international organizations, such as the Guidelines for Implementing the Occupational Safety and Health Provisions of the Maritime Labour Convention, 2006. Those guidelines are based on practical experiences and lessons learnt from ship-related accidents, incidents and even near misses, therefore are very helpful to those working on board.

Knowledge of ship's permit to work system

The ISM code requires the company to establish safe practices in ship operation, and a safe working environment. This is commonly provided for by a permit-to-work system, which consists of an organized and predefined safety procedure.

A permit-to-work does not in itself make the job safe, but contributes to measures for safe working. The following points should be taken into account when formulating such a permit:

- The permit should be relevant and as accurate as possible. It should state the location and details of the work to be done, the nature and results of any preliminary tests carried out, the measures undertaken to make the job safe and the safeguards that need to be taken during the operation.

- The permit should specify the period of its validity (which should not exceed 24 hours) and any time limits applicable to the work which it authorizes.
- Only the work specified on the permit should be undertaken.
- Before signing the permit, the authorizing officer should ensure that all measures specified as necessary have been taken.
- The authorizing officer retains responsibility for the work until he has either cancelled the permit or formally transferred it to another authorized person who should be made fully conversant with the situation. Anyone who takes over, either as a matter of routine or in an emergency, from the authorizing officer, should sign the permit to indicate transfer of full responsibility.
- The person responsible for carrying out the specified work should countersign the permit to indicate his understanding of the safety precautions to be observed.
- On completion of the work, that person should notify the responsible officer and get the permit cancelled.
- The person carrying out the specified work should not be the same person as the authorizing officer.

Enclosed space entry routines

The Standard P&I Club's loss prevention programme issues a variety of publications on safety-related subjects, of which “A master guide to: Enclosed Space Entry” is helpful to plan the lessons on this topic. It includes information about enclosed space hazards, risk assessment, entry procedures, duties and responsibilities, securing the space for entry, ventilation, testing the atmosphere, entry and rescue equipment, entry permit, completion and permit closure, rescue from an enclosed space, training and Checklists.

For more information about these publications, please contact the Standard Club or visit www.standard-club.com. (http://www.standard-club.com/news-and-knowledge/publications/loss-prevention-publications/masters-guides/)

4.1.4.2 Use personal protective equipment

Personal protective equipment

Each of the crew should use correct personal protective equipment (PPE) at work. PPE is equipment that will protect the user against health or safety risks at work. It can include items such as safety helmets, gloves, eye protection, high-visibility clothing, safety footwear and safety harnesses. It also includes respiratory protective equipment (RPE).

Use the correct personal protective equipment

Even where engineering controls and safe systems of work have been applied, some hazards might remain. These hazards include injuries to:

- Lungs, e.g. from breathing in contaminated air;
- Head and feet, e.g. from falling materials;
- Eyes, e.g. from flying particles or splashes of corrosive liquids;
- Skin, e.g. from contact with corrosive materials;
- Body, e.g. from extremes of heat or cold.

Therefore, personal protective equipment is necessary in these cases to reduce the risk.

Choosing the correct personal protective equipment

The following table lists the factors to be taken into account when choosing the correct personal protective equipment.

	Hazards	Options	Note
Eyes	Chemical or metal splash, dust, projectiles, gas and vapour, radiation	Safety spectacles, goggles, face screens, face shields, visors	Make sure the eye protection chosen has the right combination of impact/dust/splash/molten metal eye protection for the task and fits the user properly
Head and neck	Impact from falling or flying objects, risk of head bumping, hair getting tangled in machinery, chemical drips or splash, climate or temperature	Industrial safety helmets, bump caps, hairnets and firefighters' helmets	Some safety helmets incorporate or can be fitted with specially-designed eye or hearing protection. Don't forget neck protection, e.g. scarves for use during welding
Ears	Noise – a combination of sound level and duration of exposure, very high-level sounds are a hazard even with short duration	Earplugs, earmuffs, semi-insert/canal caps	Provide the right hearing protectors for the type of work, and make sure workers know how to fit them. Choose protectors that reduce noise to an acceptable level, while allowing for safety and communication
Hands and arms	Abrasion, temperature extremes, cuts and punctures, impact, chemicals, electric shock, radiation, vibration, biological agents and prolonged immersion in water	Gloves, gloves with a cuff, gauntlets and sleeve that cover part or all of the arms	Some materials are quickly penetrated by chemicals – take care in selection. Barrier creams are unreliable and are no substitute for proper PPE. Wearing gloves for long periods can make the skin hot and sweaty, leading to skin problems. Using separate cotton inner gloves can help prevent this
Feet and legs	Wet, hot and cold conditions, electrostatic	Safety boots and shoes with protective	Footwear can have a variety of sole patterns and materials to help prevent slips in different

	build-up, slipping, cuts and punctures, falling objects, heavy loads, metal and chemical splash, vehicles	toecaps and penetration-resistant, mid-sole wellington boots and specific footwear, e.g. foundry boots and chainsaw boots	conditions, including oil - or chemical-resistant soles. It can also be anti-static, electrically conductive or thermally insulating
Lungs	Oxygen-deficient atmospheres, dusts, gases and vapours	Respiratory protective equipment (RPE) Some respirators rely on filtering contaminants from workplace air. These include simple filtering face pieces and respirators and power-assisted respirators	The right type of respirator filter must be used as each is effective for only a limited range of substances. Filters have only a limited life. Where there is a shortage of oxygen or any danger of losing consciousness due to exposure to high levels of harmful fumes, only use breathing apparatus – never use a filtering cartridge
Whole body	Heat, chemical or metal splash, spray from pressure leaks or spray guns, contaminated dust, impact or penetration, excessive wear or entanglement of own clothing	conventional or disposable overalls, boiler suits, aprons, chemical suits	The choice of materials includes flame-retardant, anti-static, chain mail, chemically impermeable, and high-visibility. Don't forget other protection, like safety harnesses or life jackets

Apart from the right choice of personal protective equipment, careful selection, maintenance and regular and realistic operator training is needed for equipment for use in emergencies, like compressed-air escape breathing apparatus, respirators and safety ropes or harnesses.

4.1.4.3 Use chemicals on board

It is important to know characteristics of each a paint to be used in order to carry out painting effectively and safely. It is advisable to follow company’s instruction and/or paint maker’s instruction when using paint and thinner.

Since paints generally employ solvents with a low flash point, they emit flammable vapors at ambient temperature, and are in a state which combustion is liable to occur at all times. The vapor of solvents is heavier than air and accumulates at deck level.

Solvents also have a property to irritate the skin or mucous membranes, causing headaches and even intoxication. Since solvents dissolve fats, they may cause dry skins or dermatitis.
Depending on the type of coating being applied, the solvent based materials can pose more significant fire dangers. Lacquers contain solvents that are capable of igniting at temperatures as low as -7° C if exposed to an open flame or spark in a concentration between the LEL (lower explosive limit) and UEL (upper explosive limit).

4.1.4.4 Ventilate interior and enclosed spaces during and after painting

Solvent based paints can pose a safety and health hazard if there is little or no ventilation during the application. People with allergies can be subjected to health related responses ranging from mild asthma to severe headaches over a relatively short period. This can even come about when using paints containing the weaker hydrocarbon solvents like Stoddard solvent and mineral spirits which are found in most interior alkyds. Low odor solvents like the paraffinic naphtha can be particularly dangerous as they are difficult to smell even at relatively high concentrations. Ventilation is also a method of keeping the concentration of potentially explosive vapours from paints below the LEL (lower explosive limit). Therefore, when applying paints on interior surfaces it is important to consider the ventilation or airflow in the enclosed spaces.

To maximize safety and the film forming properties of a paint application on an interior surface, a moderate air flow can be the least expensive tool.

4.1.5 Knowledge of safe disposal of waste materials

4.1.5.1 Understand there are strict rules for the prevention of pollution covering disposal of waste materials at sea applicable to all ships

Ships produce waste materials in normal operation and some may contain harmful or hazardous materials or pollutants. The waste materials produced by the deck department include, cargo hold dunnage, packaging and lashing materials, cargo residues, residual paints or solvents and chemical cleaning agents, etc. The disposal of these waste materials should strictly follow the company SMS, relevant conventions or regulations, such as MARPOL 73/78 Convention and IMDG Code, and local regulations.

4.1.5.2 Follow correct procedures for disposal of paint residues, solvents, sweepings and other chemicals in use

The waste paints, solvents and chemicals are combustibles and pollutants and should not be stored freely or dumped into the sea. They should be collected for storage or recycled for reuse by special land organizations, in compliance with their respective procedures. For example, the disposal of ship trash or sweepings should strictly follow the regulations of Annex V to MARPOL Convention.

4.1.5.3 Operate waste handling equipment as required

Basic knowledge of operating waste handling equipment

The disposal equipment for ship waste materials mainly includes trash compactor and incinerator. For the trash not to be dumped to sea, the trash compactor can be used. The compaction processing will effectively save the storage space, as much as 80%, which benefits the environmental protection and disposal on land. Incinerators are used to dispose of waste oil and oil from oil and water separators. Incineration is the best way to dispose of oil, waste and mud from the separators, solid material and waste in sewage, oiled cloth and cotton material. The safe operation of the equipment should refer to the specifications of the manufacturers and ship equipment operational instructions.

Precautions

Ventilation is essential before using incinerators to empty oil vapor inside to prevent explosion. When the chamber reaches a certain temperature, use waste oil pump to load waste oil and remaining oil into the incinerator. When the incinerator works well, stop tinder oil, otherwise use diesel oil to keep burning. No admittance of flammable goods into the incinerator when there is burning inside to prevent accidents. Ash from the incinerator is prohibited discharging into sea. The ash should be landed ashore, and record the quantity into Garbage Record Book.

4.1.6 Knowledge of the Application, Maintenance and Use of Hand and Power Tools

4.1.6.1 Correct use of equipment

Knowledge should be obtained on the properties of the mechanical tools. The use of the tools should not exceed the designed purposes, not to cause damage to the tools or injury of the personnel. For example, the wood drills cannot be used in handling metals.

Safe working practices for using hand tools

The safe working practice for using a hand tool depends on the type of tools being used. The following table lists the safe working practices for several commonly used hand tools.

Type of tool	Description	Proper work practices
Wrenches	Wrenches come in an endless variety of styles such as socket, open-end, combination, adjustable and torque, to name a few. Wrenches are designed to turn or hold bolts, nuts or multiple-threaded	• Choose a wrench that properly fits the fastener you wish to turn. Use metric wrenches for metric bolts and American inch wrenches for inch-sized bolts; by using the correct size, the wrench is less prone to slip or round off the fastener corners. • Avoid using an extension to improve the leverage of a wrench • Do not use open-end or adjustable wrenches for final tightening or

	fasteners. They are sized to keep the leverage and load in an acceptable balance.	loosening frozen fasteners—These wrenches do not have the strength of a box-end or socket wrench • Apply penetrating oil on frozen fasteners before using a striking face box, socket or heavy-duty box wrench • Do not expose a wrench to temperatures that could weaken tool hardness • Always try to pull on a wrench (instead of pushing) in case the fastener loosens • Adjustable wrenches must be adjusted tightly to the fasteners and then pulled, putting the force on the fixed end • Turn power off and use electrically insulated wrenches when working on or around electrical components • Never alter a wrench • Do not over torque a fastener—Use a torque wrench to tighten the fastener to the exact torque required. • Inspect wrenches periodically for damage, such as cracking, severe wear or distortion • Always use non-sparking wrenches when in the presence of flammable vapors or dusts
Pliers	Pliers come in all shapes and sizes, such as lineman, diagonal cutting, needle nose, slip joint, locking tongue and groove. Plier uses include gripping, cutting, turning and bending. Pliers are a versatile tool, but must be used according to how they are designed.	• Do not increase a pliers handle length to gain more leverage, instead choose larger sized pliers • Never subject pliers to temperatures that could decrease tool hardness • Cut hardened wire only with pliers designed for that purpose • Do not substitute pliers for a wrench when turning nuts and bolts • Be sure the pliers' jaws can grasp properly when bending rigid wire • Do not hammer with pair of pliers • Cut wire at right angles without bending wire back and forth against the cutting edge of a pliers • Always use non-sparking pliers when in the presence of flammable vapors or dusts
Hammers and Striking Tools	Hammers are one of the most used tools in our tool boxes. Nail, soft-face, ball-peen,	• Always use a hammer of the proper weight and size for the task • Do not strike the surface at an angle—the hammer face should contact the

	chipping, sledge and setting are just a few of the hammers we use in the workplace and home. Many hammer types are specific to a particular industry, such as bricklayers, machinists and loggers. Each kind of hammer has a head that is tailored to work best for a particular application. Hammer handles are now made stronger, ergonomically shaped and transmit less shock to the user.	striking surface squarely, so the two are parallel. • Do not use a hammer if the handle is damaged or loose • Use a hammer face that is 3/8" larger in diameter than the striking tool. • Never weld, heat or regrind a hammer head • Remove from service any hammer exhibiting signs of excessive wear, cracks, mushrooming or chips • Do not use one hammer to strike another • Do not use the wrong hammer for the job, match the proper type of hammer to the task it is designed to perform • Always use non-sparking hammers in the presence of flammable vapors or dust
Screw-drivers	Screwdrivers are intended for turning a variety of threaded fasteners, such as machine or wood screws, in or out of materials. Screwdriver tips come in a variety of different shapes and sizes. The slotted and Phillips tips are the most common, however, torx, hex, square and various others are also used. It is important to match the type of screwdriver you use to the type of job you're doing.	• Never use a screwdriver as a pry bar, chisel, punch, stirrer or scraper. • Always use a screwdriver tip that properly fits the slot of the screw • Throw away screwdrivers with broken or worn handles • Never expose screwdrivers to temperatures that could reduce tip hardness • Turn power off and use electrically insulated screwdrivers when working on or around electrical components • Straighten tips or redress rounded edges with file • Never use pliers on a screwdriver for extra leverage; only use a wrench on screwdrivers specifically designed to accept them • Use magnetic or screw-holding screwdrivers to start fasteners in tight areas • Use both hands when using a screwdriver—one to guide the tip and the other to turn the handle. Final tightening requires both hands on the screwdriver handle • Always use non-sparking screwdrivers in the presence of flammable vapors or dusts

The type of personal protective equipment (PPE) needed when using hand tools depends on the tool being used. At a minimum, eye protection in the form of safety glasses or goggles must be worn at all times for eye protection. The simple act of snipping copper wire with side-cutting pliers, striking a nail with a hammer or sawing wood can propel small pieces of debris into the air.

It is also important to protect the hands from cuts, abrasion and repeated impact. Cut-resistant gloves made of stainless steel can help protect against the effects of a misplaced blade. Wearing standard cotton or leather gloves can help prevent wood splinters or skin abrasions from handling lumber. On jobs that require long periods of hammering, impact-resistant gloves with gel or rubber palms can reduce vibration. Safety shoes with a reinforced toe can help protect your feet from injury caused by a dropped tool. Safety footwear come in a variety of styles and are widely available. Choose footwear that offers adequate traction for your work site.

Safe working practices for using powered tools

Portable power tools are designed for a wide variety of uses. Drills, hammer drills, sanders, grinders and numerous other power tools save us time and effort on the job. The growing popularity of cordless battery-operated tools is putting power tools to use in more places than ever before, heightening the need for awareness of the dangers they present if not operated properly. The following safety rules are common to all power tools. In addition, each type of tool has its own unique hazards, which must be taken into account.

- Read the manual to understand the tools proper applications, limitations, operation and hazards;
- Do not use electric power tools in the proximity of flammable vapors, dusts or construction materials. Also avoid using electric power tools in wet environments;
- Protect yourself from electric shock by insuring your tools are properly grounded; use a Ground Fault Circuit Interrupter for corded tools;
- Always check for hidden wires that may contact bladed tools;
- Select a tool based on the task for which it is designed;
- Only use attachments specifically recommended for your power tools, and ensure their proper installation;
- Inspect tools for damage including the cord, presence of guards, correct alignment, binding of components, or any condition that would affect the operation of the tool;
- If a tool is damaged, or a condition develops while a tool is in use, have the tool fixed before using it again;
- Avoid excessive force to make cutting tools cut faster; feed material only as fast as the tool is designed to accept to prevent excessive wear and decreased control;
- Keep others away from the work area, or provide shields to stop flying debris and other distractions;
- Do not operate a power tool if you are under the influence of medications or alcohol, or if you are tired or distracted;
- Verify that all tools are unplugged or that the power source is removed when changing blades, performing maintenance or when tools are not in use;
- Keep tools in a secure location when not in use;

- Avoid unintentional tool start-up by keeping your finger off of the power switch.

Power tools present more hazards than hand tools due to the speed at which they operate. There are distinct differences between the PPE suggested for use with hand tools and the PPE recommended for safe power tool use.

Eye protection, such as safety glasses or goggles, is especially important when using power tools. The speed in which drills, saws, grinders, sanders and routers operate can propel small particles much faster and farther than do hand tools. Others working around the area where power tools are used should also wear protective eyewear. Certain power tools may require using a face shield, in addition to safety glasses or goggles. For example, a face shield is recommended while using a grinder, due to the amount of hot metal particles generated.

Along with PPE, proper attire is also important while using power tools. Tie back or cover long hair, wear loose fitting clothes and remove all jewelry to avoid being caught in moving blades.

Basic knowledge of making a report and isolating idling equipment

When finding defective or damaged equipment, it is necessary to report to the boatswain or head of department and render disposal in accordance with the safety management system, including taking measures to warn the abnormal state of the equipment to prevent injury or casualty of man or damage to the equipment.

Idling equipment not in use should be isolated and its maintenance should be conducted in accordance with the specifications and lashing and fixing should be rendered to ensure safety.

4.1.6.2 Select appropriate measuring equipment and understand how it is used

The measuring equipment commonly used on board include pressure and temperature gauges as well as gas measuring equipment, which are available onboard for checking the pressure, temperature of a specific location and the concentration of explosive or toxic gases or vapours. All measuring equipment must be maintained in good working order and calibrated annually as per the planned maintenance system.

Personnel using measuring equipment should always follow the manuals on board and manufacturer’s recommendations regarding its specific operation and maintenance.

4.1.6.3 Select correct hand or power tools

Principle of selection of tools

Tools commonly used on board include hand tools, such as hammers and wrenches, and power tools, such as pneumatic, hydraulic or electric equipment. The greatest hazards posed by those tools result from misuse and improper maintenance. Tools selected must be ergonomic tools. A tool becomes “ergonomic” only when it fits the task you are performing and it fits your hand without causing awkward postures,

harmful contact pressures or other safety and health risks. If you select and use a tool that does not fit your hand or use the tool in a way it was not intended, you might develop an injury such as carpal tunnel syndrome, tendonitis or muscle strain. These injuries do not happen because of a single event but result from repetitive movements performed over time. These repetitive movements may result in damage to muscles, tendons, nerves, ligaments, joints, cartilage, spinal discs or blood vessels.

Therefore, before picking up a tool and beginning to work, always think about the requirements of the job, and select tools designed for the intended and specific use purpose. Always avoid using a tool for something other than its intended purpose and assess the work space to determine which tool will work efficiently and safely in that space.

Selection of correct type of drill bit, cutting blade, abrasive wheel etc.

The correct selection of drill bit, cutting blade and abrasive wheel etc. is essential for accomplishing an intended specific job. Take drill bit for an example which is a cutting tool used to remove material to create holes. Because different projects have different needs, drill bits come in a variety of shapes and are made from different materials based on the task they are designed to perform. Choosing the wrong drill bit can lead to structural flaws in the project, broken bits, and even damaged drills. Selecting a bit that is made from the right material will help ensure the hole drilled has a smooth edge and that none of the equipment being used is damaged in the process. The best way to determine what drill bit is right for the job is to have an understanding of all the available types and make an informed decision based on that understanding.

4.1.6.4 Use of welding equipment for temporary and simple repair works on deck

Basic knowledge of correctly setting and operating welding equipment

All welding and other equipment used for hot work should be carefully inspected before each occasion of use to ensure that it is in good condition. It is a principle that the welder's manual should be strictly followed which in general includes a chart for setting the heat (amperage) range for the thickness of the metal to be welded. If a wire feed welder is used, this chart will also suggest a wire speed setting. Minor adjustments for the best possible weld bead may be necessary. Some new welders automatically make the proper heat and wire speed settings once the operator dials in the thickness of the metal.

Precautions when operating welding equipment

When using welding equipment it should be ensured that:

- Existing supply wiring is adequate to carry the electrical current demand without overloading, where required, it must be correctly earthed;
- Insulation of the electric cables is in good condition;
- The welding return lead should be connected as near as practicable to the welding arc;

- Metal rails, pipes and frames should not be used as part of the welding circuit unless they are a part of the work piece itself.

Part E: Evaluation

The effectiveness of any evaluation depends to a great extent on the precision of the description of what is to be evaluated. The detailed teaching syllabus is thus designed, to assist the Instructors, with descriptive verbs, mostly taken from the widely used Bloom's taxonomy.

Evaluation/Assessment is a way of finding out if learning has taken place. It enables the assessor (instructor), to ascertain if the learner has gained the required skills and knowledge needed at a given point towards a course or qualification.

The purpose of evaluation / assessment is to:

- To assist trainees learning.
- To identify trainees strengths and weaknesses.
- To assess the effectiveness of a particular instructional strategy.
- To assess and improve the effectiveness of curriculum programs.
- To assess and improve teaching effectiveness.

The different types of evaluation/assessment can be classified as:

Initial / Diagnostic assessment

This should take place before the trainee commences a course/qualification to ensure they are on the right path. Diagnostic assessment is an evaluation of a trainee's skills, knowledge, strength and areas for development. This can be carried out during an individual or group setting by the use of relevant tests.

Formative assessment

Is an integral part of the teaching/learning process and is hence is a "Continuous" assessment. It provides information on trainee's progress and may also be used to encourage and motivate them.

Purpose of formative assessment

- To provide feedback to trainees.
- To motivate trainees.
- To diagnose trainees strengths and weaknesses.
- To help trainees to develop self-awareness.

Summative assessment

It is designed to measure trainee's achievement against defined objectives and targets. It may take the form of an exam or an assignment and takes place at the end of a course.

Purpose of summative assessment

- To pass or fail a trainee
- To grade a trainee

Evaluation for Quality assurance

Evaluation can also be required for quality assurance purposes.

Purpose of assessment with respect to quality assurance

- To provide feedback to Instructors on trainee's learning.
- To evaluate a module's strengths and weaknesses.

- To improve teaching.

Assessment Planning

Assessment planning should be specific, measurable, achievable, realistic and time-bound (SMART).

Some methods of assessment that could be used depending upon the course/qualification are as follows and should be adapted to suit individual needs:

- Observation (In Oral examination, Simulation exercises, Practical demonstration);
- Questions (written or oral);
- Tests;
- Assignments, activities, projects, tasks and/or case studies
- Simulations (also refer to STCW Code, section A-I/12);

Validity

The evaluation methods must be based on clearly defined objectives, and it must truly represent what is meant to be assessed, for example only the relevant criteria and the syllabus or course guide. There must be a reasonable balance between the subject topics involved and also in the testing of trainees' KNOWLEDGE, UNDERSTANDING AND PROFICIENCY of the concepts.

Reliability

Assessment should also be reliable (if the assessment was done again with a similar group/learner, would you receive similar results). You may have to deliver the same subject to different group of learners at different times. If other assessors are also assessing the same course/qualification as you, we need to ensure all are making the similar decisions.

To be reliable, an evaluation procedure should produce reasonably consistent results no matter which set of question papers or version of the test is used.

If the Instructors are going to assess their own trainees, they need to know what they are to assess and then decide how to do this, bearing in mind that, for the award of CoCs or CoPs, instructors may not assess their trainees to comply with the requirements of the Convention. The “what*”* will come from the standards/learning outcomes of the course/qualification they will deliver. The “how*”* may already be decided for them if it is an assignment, test or examination.

The instructors need to consider the best way to assess the skills, knowledge and attitudes of learners, whether this will be formative and/or summative and how the assessment will be valid and reliable.

All work assessed should be valid, authentic, current, sufficient and reliable; this is often known as VACSR – "valid assessments create standard results".

- Valid – the work is relevant to the standards/criteria being assessed:
- Authentic – the work has been produced solely by the learner;
- Current – the work is still relevant at the time of assessment;
- Sufficient – the work covers all the standards/criteria:
- Reliable – the work is consistent across all learners, over time and at the required level.

It is important to note that no single method can satisfactorily measure knowledge and skill over the entire spectrum of subjects to be tested for the assessment of competence.

Care should therefore be taken to select the method most appropriate to the particular aspect of competence to be tested, bearing in mind the need to frame questions which relate as realistically as possible to the requirements of the tasks on board.

STCW Convention 1978, as amended

The training and assessment of seafarers, as required by the Convention, are administered, supervised and monitored in accordance with the provisions of section A-I/6 of the STCW Code.

The knowledge, understanding and proficiency in column 2, methods for demonstrating competence in column 3 and criteria for evaluating competence in column 4 of Table A-II/5 of the STCW Code, set out the methods and criteria for evaluation.

Instructors should refer to this table when designing the assessment.

Evaluation of competence

The arrangements for evaluating competence should be designed to take account of different methods of assessment which can provide different types of evidence about candidates' competence, e.g.:

1. direct observation of work activities;
2. skills/proficiency/competency tests;
3. projects and assignments;
4. evidence from previous experience; and
5. written, oral and computer-based questioning techniques.

One or more of the first four methods listed should almost invariably be used to provide evidence of ability, in addition to appropriate questioning techniques to provide evidence of supporting knowledge and understanding.

Assessment is also covered in detail in IMO Model Course 3.12, however to assist Instructors, some extracts from the Model course is used to explain this in depth.

Multiple choice questions

Marking or scoring is easier if multiple-choice test items are used, but in some cases difficulties may arise in creating plausible distracters.

Detailed sampling allows immediate identification of errors of principle and those of a clerical nature. It must be emphasized that this holds true, in general, only if the test item is based on a single step in the overall calculation. Multiple-choice items involving more than one step may, in some cases, have to be resorted to in order to allow the creation of a sufficient number of plausible distracters, but care must be exercised to ensure that distracters are not plausible for more than one reason if the nature of the error made (and hence the distracter chosen) is to affect the scoring of the test item.

Compiling tests

Whilst each examining authority may establish its own rules, the length of time which can be devoted to assessing the competence of candidates for certificates of competency is limited by practical, economic and sociological restraints. Therefore, a prime objective of those responsible for the organization and administration of the examination system is to find the most efficient, effective and economical method of assessing the competency of candidates. An examination system should effectively test the breadth of a candidate's KNOWLEDGE, UNDERSTANDING AND PROFICIENCY of the subject areas pertinent to the tasks he is expected to undertake. It is not possible to examine candidates fully in all areas. In effect, the examination samples a candidate's KNOWLEDGE, UNDERSTANDING AND PROFICIENCY by covering, as wide a scope as is possible, within the time constraints and testing the trainee's depth of KNOWLEDGE, UNDERSTANDING AND PROFICIENCY in selected areas.

The examination as a whole should assess each candidate's comprehension of principles, concepts and methodology; the trainee's ability to: apply principles, concepts and methodology; organize facts, ideas and arguments; and the trainee's abilities and skills in carrying out those tasks the trainee will be called upon to perform in the duties to be certificated to undertake.

All evaluation and testing techniques have their advantages and disadvantages. An examining authority should carefully analyze precisely what should be tested and can test. A careful selection of test and evaluation methods should then be made to ensure that the best of the variety of techniques available today is used. Each test shall be that best suited to the learning outcome or ability to be tested.

Quality of test items

No matter which type of test is used, it is essential that all questions or test items used should be as brief as possible, since the time taken to read the questions themselves lengthens the examination. Questions must also be clear and complete. To ensure this, it is necessary that they be reviewed by a person other than the originator. No extraneous information should be incorporated into questions. In all cases, the questions should be checked to ensure that they measure an objective which is essential to the task concerned.

SCORING TESTS

Scoring subjective tests

The assessment of seafarers is concerned with evaluating whether they are competent, in terms of meeting sufficient specified learning objectives, to perform the tasks required by the qualification they are seeking. They should be tested against predetermined criteria rather than against the performance of other examinees or the norm for the group as a whole, as is the case in many examinations.

To achieve that end in subjective tests, an analytical scoring scheme should be drawn up and complete model answers, which would attract full marks, should be produced for each question. The model answer is then analyzed for the definitions, facts, explanations, formulae, calculations, etc., contained in it and marks are allocated to each item, the aim being to make the scoring as objective as possible. A subjective element will still exist in the original allocation of marks to the various

sections and, to some extent, in the scoring of incomplete or partially correct sections.

Either credit scoring or deductive scoring may be used. In credit 'scoring, marks are awarded, in accordance with the scoring scheme, for each correctly completed part of the answer, no marks being credited for incorrect parts or omissions. With deductive scoring, marks are deducted for errors and omissions from the total mark for the question or part question (where a question has been divided into two or more sections). When applied to essay questions, the two methods should produce virtually the same score. Deductive scoring is usually confined to the marking of calculations.

Deductive scoring can be weighted to take account of the relative seriousness of different types of error. Errors are commonly classed and weighted as follows:

.1 errors of principle; for example, using the formula for righting moment in a calculation of list; deduct 50% of the mark for the question or part question;

.2 major errors; for example, extracting data for the wrong day or time from the nautical Almanac; deduct 30% of the mark for the question or part question; and

.3 clerical errors; for example, transposition of numbers from tables or question paper, careless arithmetic; deduct 10% of the mark for the question or part question for each error.

In the case of clerical errors, only one deduction for a single error should be made. No deductions are made for incorrect answers which follow through from the original error.

If deductions exceed the total mark for a question or part question it is given a zero score; negative scores are not carried over to other parts.

The different types of error can be taken into account in credit scoring schemes by suitably weighting the marks allocated to method, to the extraction' of data and to clerical accuracy at each step of the calculation. The steps need to be smaller and more detailed than the division into parts used in deductive marking. As a result, the marks lost for errors of principle tend to be smaller in credit scoring than in deductive scoring.

A small percentage of the total mark, to be credited only for the correct final answer, is sometimes included in a credit scaring scheme. The answer must lie within stated accuracy limits to qualify for that credit. In deductive schemes, an answer that has otherwise been correctly calculated but which falls outside the accuracy limits are treated as a clerical error.

Where tests are to be marked locally at more than one test centre, a well-defined scoring scheme, which will give the same score when applied to the same paper by different markers, is essential for the uniform and fair treatment of candidates. To aid in any subsequent review of marks, possibly resulting from an appeal, the marker should make brief marginal notes on the paper to indicate, the reasons for deductions.

Guidance on the treatment of answers produced using calculators is needed.

Examination rules usually warn candidates that all working must be shown to gain full marks for a question. The marks to deduct when insufficient working is shown but a

correct answer is produced, or when all working is correctly shown but the answer is wrong, need to be known by the marker.

In papers in which all questions are to be answered, the marks may be weighted to reflect the importance or difficulty of individual questions or the length of time which will be needed to answer them. When this is done, it is usual to indicate: the mark for each question on the question paper. Optional questions should all be of similar standard and carry equal marks, so that the standard of the complete test is the same regardless of the questions chosen.

Use can be made of a compulsory and an optional section in the same paper.

Questions on which it is felt that all candidates should be tested can be placed in the compulsory section and suitably weighted, while the remainder of the paper offers a choice of questions each of similar standards.

A problem that arises with optional papers is how to deal with cases where more than the required number of questions is answered. Various solutions 'are adopted by different examining boards. Many mark all questions and discard the lowest marked question or questions; although that fact is not generally advertised as it may encourage candidates to attempt extra questions. Others take the requisite number of answers in the order in which they are on the question paper and ignore the remainder. A similar problem arises in papers in which candidates are required to answer a given number of questions and including at least some stated number from each of several sections.

The pass mark should be set at the lowest score for which sufficient skills and knowledge is demonstrated for competency in each subject. In practice, that score is difficult to determine exactly for an individual paper and could vary slightly from one examination to another. Such an arrangement would be difficult to administer and would be considered unfair by candidates, so the pass mark is fixed and published in the examination regulations. It is, therefore, essential when preparing papers to maintain as constant a standard as possible, such that the pass mark is an appropriate measure of competency.

The following instructions are typical of those produced for guidance of examiners on the marking of examinations:

In order to achieve uniformity in marking between the Examiners in various centres and to facilitate the review of papers, the following guidelines are to be used at all centres:

.1 When several candidates write the same examination, papers, other than multiple choice, should be marked question by question, that is to say, question 1 of paper 1 should be marked for all applicants before proceeding to question 2, etc. This gives more uniform marking.

.2 All questions should be marked even if it becomes apparent that the candidate cannot achieve the pass mark.

.3 Neatness and Orderly Layout of Work:

Where work is not properly laid out or is not neat, marks should be deducted without regard to correctness of the answer. The number of marks deducted should vary according to the quality of the work up to a maximum of 10% where the correct answer is obtained.

.4 Important Nautical and Technical Terms:

Where, in general calculations or general questions, an incorrect term is used and such a term is incidental to the work, the Examiner should exercise his judgment as to whether or not marks should be deducted, but in any case, a deduction should not exceed 10% of the allotted marks. This does not apply to direct answers involving definitions or in answers involving the naming of parts.

.5 Types of Errors:

Errors can be divided into 3 types:

(a) P - error in principle; 50% of marks allotted for the whole or part of the question should be deducted.

(b) C - clerical error; 10% of the marks allocated should be deducted for each such error.

(c) M - major error, 30% of the marks allotted for the question or part of the question should be deducted.

NOTE: Large mark questions should be considered in their main sections and percentages of the sections deducted. Candidates should be given the benefit of any doubt which may exist.

.6 Drawings:

Too much importance should not be attached to elaborate drawings. Often a simple sketch with captions is very explanatory and indicative of a good understanding.

.7 Incomplete Answers:

Where a problem or distinct section of a large problem is only partly worked and a step of principle remains to be made, marks allotted should not exceed 50% of the total marks or the split marks allotted as the case may be.

.8 Marking papers:

When marking papers, Examiners should enter appropriate marginal notes in brief showing why marks have been deducted, using abbreviations in Paragraph 5. The actual error should be ringed and marked with a brief statement of the reason for the error, e.g., 'wrong day'. A paper should be so marked that any reviewing Examiner can see at a glance just what happened, including a marginal note to indicate award of a 'benefit of doubt'.

.9 Accuracy:

The following is a general rule to Examiners of the degree of accuracy expected:

(a) in calculating a ship's position, ±0.5 minutes of arc and to the nearest second of time;
(b) for a position line, to within 0.5 of a mile of the true result;
(c) in calculating compass errors, bearings and courses, ±0.5 of a degree;
(d) distances within 0.5 of a mile and times of meridian passage, to the nearest minute;
(e) tidal prediction, to ± 15 cm.

.10 In the case of marginal failure, the paper concerned should be carefully reviewed.

This review is not to be regarded as having the purpose of passing the candidate, it is to ensure that the foregoing marking standards have been correctly applied and are consistent with those of other responses to the same examination. It may result in either an increase or a decrease in marks assigned. This review having been completed, the examiner should issue a fail result if it is still below the pass mark.

.11 Use of Calculators:

When a non-programmable calculator is used by a candidate in an examination, all necessary formulae and transpositions must be shown for full marks to be allotted. In the case of a correctly set out answer, or partial answer, which has an incorrect final result, 30% of the whole or part should be deducted on the major error rule.

When the evaluation consists of oral and practical tests which many topics as per the table A-II/5, column 2 Knowledge, understanding and proficiency require, the following should be taken into consideration.

Advantages and disadvantages of oral and practical tests

It is generally considered advisable that candidates for certificates of competency should be examined orally. Some aspects of competency can only be properly judged by having the candidate demonstrate the ability to perform specific tasks in a safe and efficient manner. The safety of .the ship and the protection of the marine environment are heavily dependent on the human element. The ability of candidates to react in an organized, systematic and prudent way can be more easily and reliably judged through an oral/practical test incorporating the use of models or simulators than by any other form of test.

One disadvantage of oral/practical tests is that they can be time-consuming. Each test may take up about 1 to 2 hours if it is to comprehensively cover the topics concerned.

Equipment must also be available in accordance with the abilities that are to be tested. Some items of equipment can economically be dedicated solely for use in examinations.

Appendix 1: Example Lesson

Teaching Unit: Procedures and order of events for the use of anchors in various operations

In earlier lessons the trainees achieved knowledge of:

- All special given orders or visual hand signs
- The danger areas at different operations
- Safety procedures and Personal Protective Equipment (PPE) in different operations and tasks.

This teaching unit comprises eight lessons.

Lesson	Topic	Educational objective
1 + 2	Anchor gear	The trainees shall understand typical anchor gears installed on board.
3 + 4	Anchor gear	The trainees prepare their own drawings and overviews.
5 + 6	Procedure of letting go anchor	The trainees shall prepare their own checklist
7 + 8	Procedure of weighing anchor	The trainees shall prepare their own checklist

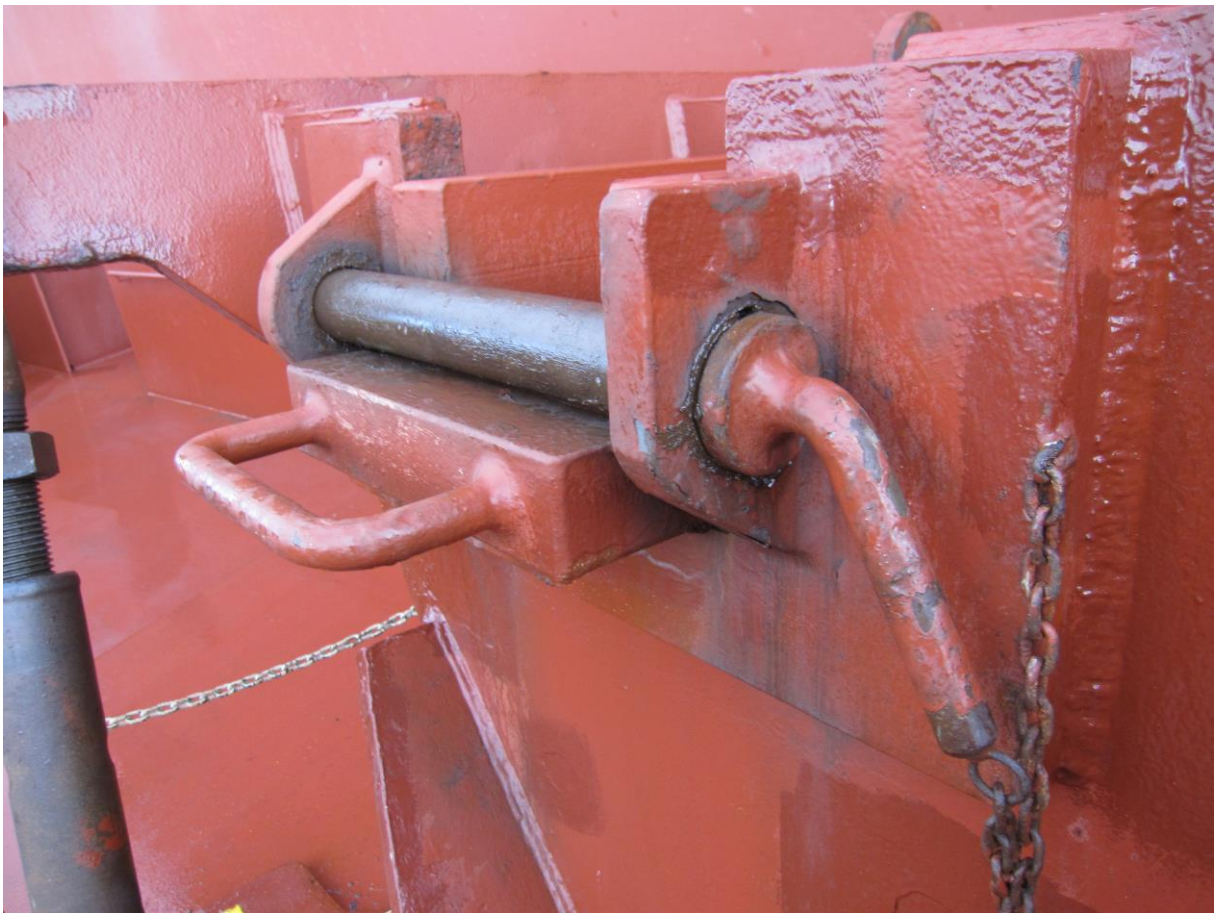
Planned course of lessons no. 1 and 2

Length of time (min.)	Phase	Lesson plan	Teaching method Media
5	Introduction	The trainer introduces the lesson plan.	Trainer's lecture Beamer
75	Development	The trainer introduces typical anchor gears installed on board. – The general principles of anchoring, forces, water depth, anchor chain length – Anchor windlasses – Types of anchors – Construction of anchor chain including marking of kenter shackles – Certification of anchor chain cable	Trainer's lecture Beamer
10	Summary	The trainees make notes and ask comprehension questions.	Dialogue

Example presentation slides for lesson no. 1

Anchor windlass

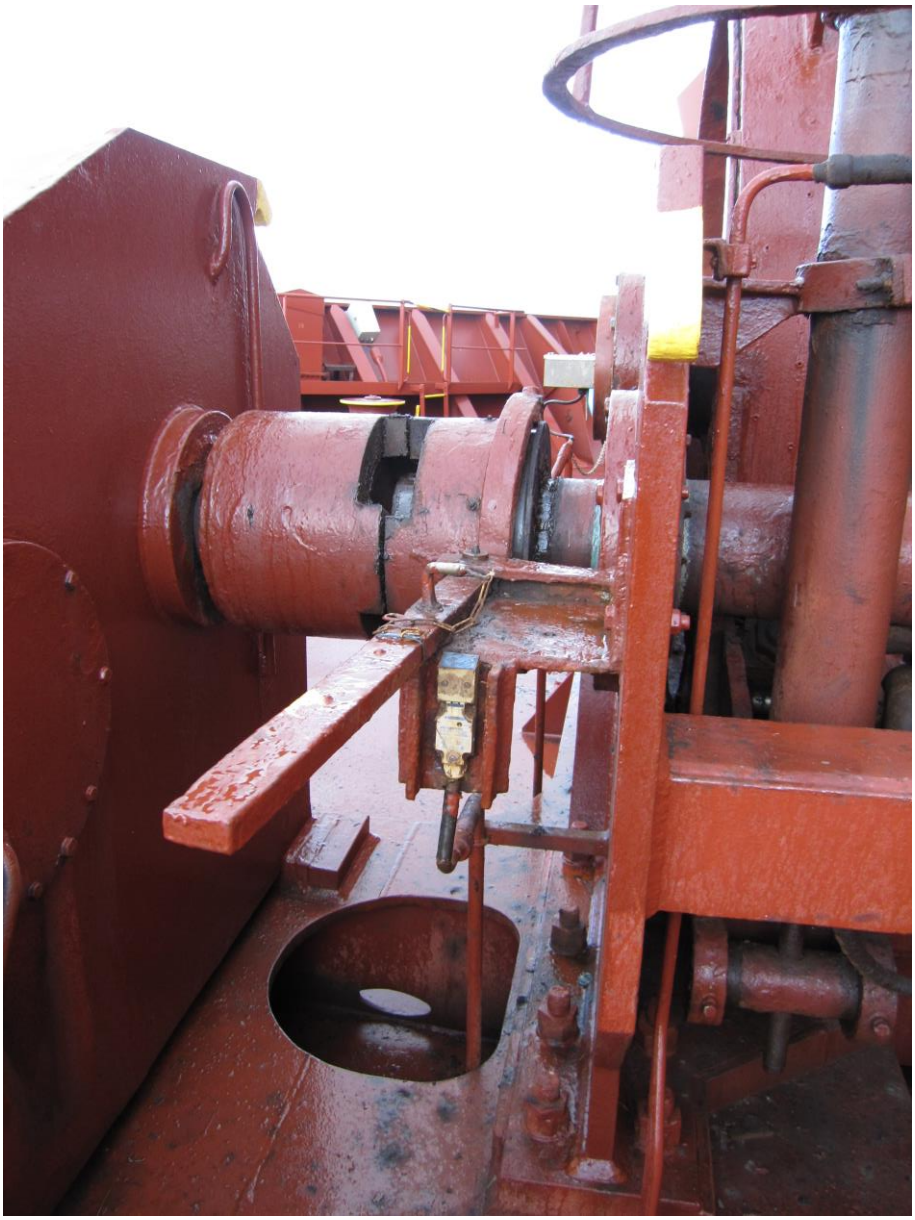
Hawse flap



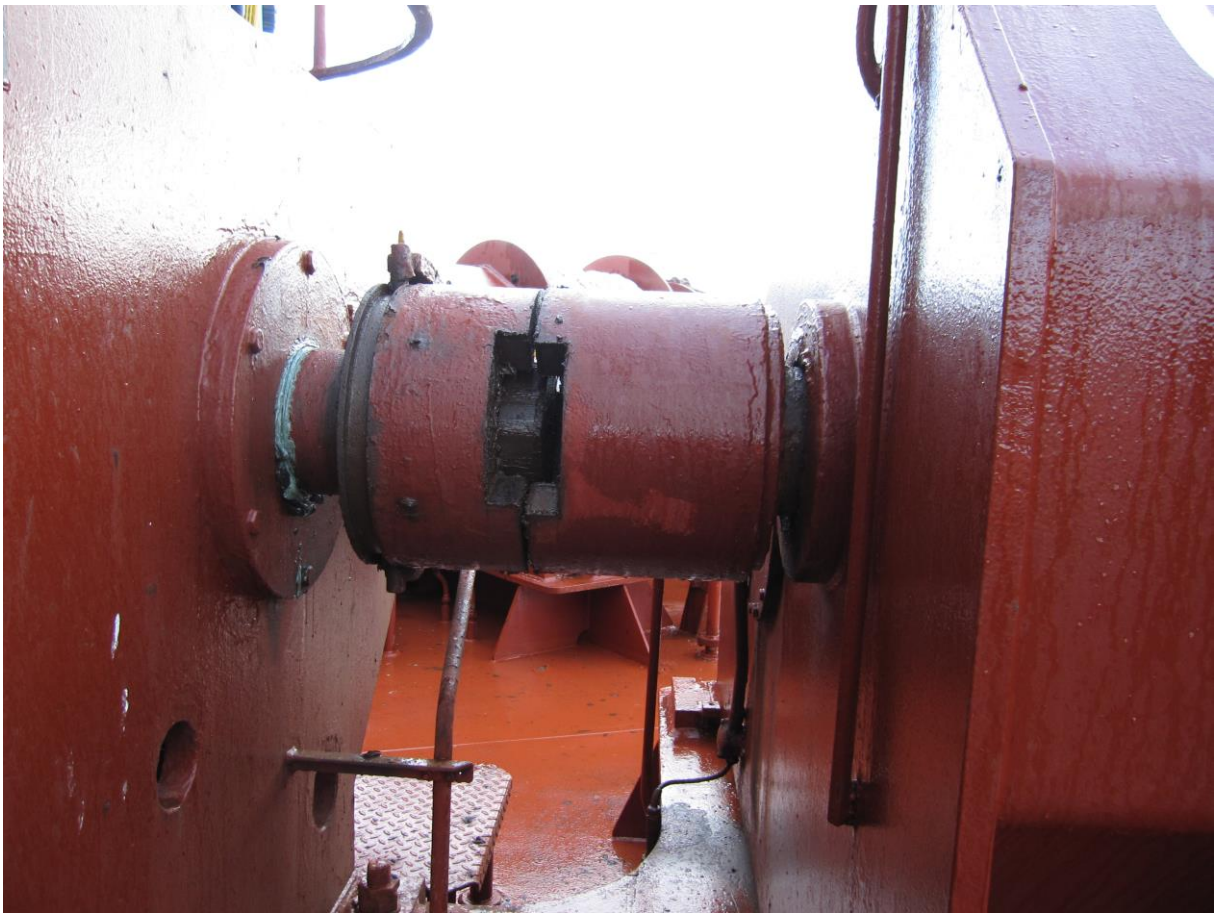
Securing bolt for chain stopper

Chain stopper

Counter weight for chain stopper



Jaw clutch with handle



Jaw clutch

Break cylinder including manual operation wheel

Anchor windless control stand

Hawse pipe with chain washing installation

Valve for hawse washing water

Bolt of chain bitter ends

Hammer to move bolt of chain bitter ends

Cover of chain locker

Spare kenter shackle

It is recommended to take further details and pictures from T3, Ship Knowledge, Chapter 10; Dokmar Publications.

Planned course of lessons no. 3 and 4

Length of time (min.)	Phase	Lesson plan	Teaching method Media
5	Introduction	The trainer introduces the lesson plan.	Trainer's lecture Beamer
65	Development	The trainees are assigned in groups of two. The trainees prepare their own drawings and overviews of anchor gears.	Teamwork Working sheets
10	Summary	The trainees compare their results with already prepared sample solutions.	Teamwork
10	Analysis	Trainer and trainees reflect tasks and results.	Dialogue

The trainer prepares working sheets providing drawings and overviews of anchor gears in which the right English shipboard terms have to be added.

It is recommended to take further details and pictures from T3, Ship Knowledge, Chapter 10; Dokmar Publications.

Planned course of lessons no. 5 and 6

Length of time (min.)	Phase	Lesson plan	Teaching method Media
5	Introduction	The trainer introduces the lesson plan.	Trainer's lecture Beamer
65	Development	The trainees are assigned in groups of two. The trainees shall prepare their own checklist for letting go anchor.	Teamwork Checklist
10	Summary	The trainees compare their results with an already prepared sample solution.	Teamwork
10	Analysis	Trainer and trainees reflect tasks and results.	Dialogue

The following list provide a comprehensive example for a checklist for letting go anchor.

- The master will give the order to make (starboard/port) anchor ready for letting go. Confirm depth of water, type of bottom and number of shots to let out.
- The foredeck crew will usually consist of the chief mate, bosun and one deck rating. Eye protection is required to protect from flying rust and dust. PPEs and hard hats are to be worn. Gloves are recommended for use with the required turnbuckle wrench and mallet.
- Assemble tools and look over the side to make sure all is clear;
- Turn on power to windlass;
- Ease off on the brake for the anchor to be used;
- Engage the wildcat and take up tension on the chain;
- Back off on the turnbuckle and disconnect pelican hook;
- Ease the chain out and stop on the signal of the mate who will ensure that the anchor is eased out enough to allow a free descent when the brake is released;
- Put the brake on tightly and place the pelican hook on the chain but keep it lazy;
- Disengage the wildcat, to be ready for letting go under controlled conditions;
- Upon receiving the command from the bridge to let go, once again check over the side, ensure that the foredeck is clear and safe when clear, knock the turnbuckle pelican hook off the chain with the mallet;
- Ease off on the brake and drop the anchor under control to the bottom. Once on the bottom it will be necessary to place some pressure on the brake so that as the ship eases back, the chain pays out as needed and does not pile up upon itself. The bosun or rating will call out the shots as they pass across the deck until the desired length is at the water's edge or on deck whereupon the brake will be fully engaged, and the turnbuckle will be placed on the chain to take the strain. Once this is done, the brake will be eased and all strain removed from the windlass;
- Raise the black ball day shape or turn on the anchor lights as appropriate;
- The foredeck crew informs the bridge and stands by until it is determined that the anchor has been set and holding.

Planned course of lessons no. 7 and 8

Length of time (min.)	Phase	Lesson plan	Teaching method Media
5	Introduction	The trainer introduces the lesson plan.	Trainer's lecture Beamer
65	Development	The trainees are assigned in groups of two. The trainees shall prepare their own checklist for weighing anchor.	Teamwork Checklist
10	Summary	The trainees compare their results with an already prepared sample solution.	Teamwork
10	Analysis	Trainer and trainees reflect tasks and results.	Dialogue

The following list provides a comprehensive example for a checklist for weighing anchor.

- Assemble foredeck crew with required gear;
- Rig and charge the foredeck fire station hose to the hawse pipe and prepare to wash off mud from incoming chain;
- Have a deck rating standby the chain locker to make sure that the chain spills evenly and does not become entangled or fouled. At no point shall anyone enter the chain locker for any reason while anchoring or hauling is taking place. At other times, it will require the permission of the officer on watch;
- Turn on the windlass and wait for the bridge to pass the word to "heave in";
- Engage the wildcat;
- Take up on chain and, with the mallet; knock off the turnbuckle pelican hook. The Mate or member of the foredeck crew will inform the bridge of the direction the chain is leading. Special attention will be paid to minimize the chain from tending across the bow by signaling the bridge right away. Inform the bridge when the chain is "up and down' and when the anchor is "aweigh". Upon sighting the anchor, inform the bridge whether it is clear or foul;
- Heave in until the anchor is snugged in the hawse; drop day shape or switch navigation lighting as appropriate after informing the bridge;
- Engage the turnbuckle and pelican hook and start taking up on the turnbuckle while easing the chain off the wildcat so that when the turnbuckle is as tight as possible and the anchor is made fast and secure the chain between the

turnbuckle and wildcat has a small catenary indicating that there is no tension on the wildcat or windlass;

- Disengage the wildcat and engage the brake;
- Notify the bridge.