SINGAPORE POLYTECHNIC
SINGAPORE MARITIME ACADEMY

NAVIGATION PART A

Course(s):	**Class 2/1 Deck Preparatory Course**
Module Code / Name:	MA 2020 / Navigation Part A

Instructional Hours

Lecture (L):	27
Tutorial (T):	45
Practical (P):	Nil
Total:	72
Credit Units:	NA

Module Aims

To meet the mandatory requirements, under Chapter II and Section A-II/2 of STCW Regulation as amended **(including 2010 Manila Amendments)**, for knowledge, understanding and proficiency in the function **'Navigation at Management Level'**, as applicable to ships of 500GT or more, necessary to support the execution of tasks, duties and responsibilities in relation to:

- planning a voyage and conducting navigation
- use of publications
- ships routeing
- ship reporting systems
- tidal predictions at standard and secondary ports
- determining position and the accuracy of resultant position fix by any means
- establishing watchkeeping arrangements and effective bridge teamwork procedures
- operational features and limitations of modern systems of navigation, including Radar, ARPA AIS and ECDIS.
- co-ordinate SAR procedures
- maintain safe navigation through the use of information from navigation equipment and systems to assist command decision making
- maintain the safety of navigation through the use of ECDIS and associated navigation systems to assist command decision making

Teaching Methods

For convenience of teaching and learning, the syllabus is divided into two parts. Instruction will take place through a combination of lectures and tutorials. The lectures will introduce the key concepts, principles and good practices, whilst the tutorials (mainly conducted in the Chart Navigation Laboratory for Part-A) will be used, through structured exercises, to enhance understanding and attain proficiency where intended. Use of case studies will be made where appropriate.

Part-A covers Navigation in general including voyage planning, routeing, position determination, watchkeeping and bridge teamwork and use of ECDIS.

Part-B covers teaching of Navigational equipment and aids.

Means of Assessment

Assessment will be made in each part, at the end of the module (18th week), by a 3 hour combined written examination for Parts-A and Part B. Students will also be assessed on their performance in class separately for each part by various Class Assessments (CA). The CA (total of both parts) and the combined end-of-module examination will carry 25% and 75% weightage respectively. An overall pass %age of 60 in the full paper (Navigation) will be required before a student is declared to have passed the Module.

Assessment	Details	Remarks
CA1	15% - Part A	Written Test, in Week 8
CA2	10% - Part B	Assignment
EOC	75%	60% questions from Part A and 40% questions from Part B (End of Course written paper of 3 hour duration)
Pass Marks	60%	Add CAs and EOC
Re-sit and Re-exam	100%	No CA component added

Recommended Texts Latest edition, as applicable

1. Admiralty Manual of Navigation Vol.1 (HMSO)
2. Practical Navigation for Second Mates - Frost (Brown, Son & Ferguson)
3. Bridge Procedures Guide – ICS (Witherby)
4. Marine Observer's Handbook – Met Office (HMSO)
5. Bridge Team Management: A Practical Guide – Swift (Nautical Institute, UK)
6. Nautical Institute on Command (Nautical Institute, UK)
7. The Mariner's Handbook (Admiralty, Hydrographer to the Navy)
8. Radar & ARPA Manual – Bole & Dineley (Heinemann)
9. Electronic Aids to Navigation – Tetley & Calcutt (Edward Arnold)
10. The Electronic Chart – Function, Potential and Limitations of a New Marine Navigation System by Hecht, Berking, ButtgenbachmLonas, Alexander
11. ECDIS publications by Nautical Institute UK
12. ECDIS and Positioning by Dr Andy Norris
13. Mariners Handbook – Latest edition
14. How to keep your Admiralty Charts up-to-date
15. The Electronic Chart Display and Information System by Adam Weintrit

Reference Texts – Latest edition, as applicable

1. STCW Manila 2010 Amendments (IMO)
2. SOLAS 74 –Consolidated Edition (IMO)
3. Ship's Routeing (IMO)
4. Performance Standards for Ships Navigation Equipment (IMO)
5. Assembly Res. A648 (16) General Principles for Ship Reporting Systems (IMO)
6. IAMSAR Manual-Vol 3 (IMO)
7. Ocean Passages for the World (Admiralty, Hydrographer for the Navy)
8. Navigation Control Manual – Bole, Dinelley and Nicholls (Hienemann)
9. Nautical Institute on COMMAND
10. Shipmaster's Business Self-examiner

Special Requirements

1. Classroom with chart tables (Chart Navigation Laboratory)
2. Copies of various navigational publications used in passage planning
3. Passage PlanninECDIS Lab to demonstrate ENCs and associated features

Tables of Specifications

P.T.O.

Topics		Abilities (%)			Total (%)
		K	C	A/HA	
A	**PLAN A VOYAGE AND CONDUCT NAVIGATION**	3	4	10	17
B	**DETERMINE POSITION AND THE ACCURACY OF RESULTANT POSITION FIX BY ANY MEANS**	5	7	30	42
C	**CO-ORDINATE SEARCH AND RESCUE OPERATIONS**	1	2	2	5
D	**CALCULATION OF TIDAL CONDITIONS**	2	2	4	8
E	**MAINTAIN SAFE NAVIGATION THROUGH THE USE OF INFORMATION FROM NAVIGATION EQUIPMENT AND SYSTEMS TO ASSIST COMMAND DECISION MAKING**	2	2	3	7
F	**BEST MANAGEMENT PRACTICE AGAINST PIRACY AND RELATED INCIDENTS**	1	1	1	3
G	**LATEST UPDATES FROM IMO, MPA AND RELEVANT SIMILAR BODIES**	2	3	3	8
H	**ASSESSMENT**	2	4	4	10
	Total	18	25	57	100
Infusion of SP Core Values:					

Note 1:
The letter K, C, A & HA in the table of specifications denotes the knowledge, comprehension, application and higher than application levels of Bloom's Taxonomy in the cognitive domain.

Note 2:
In the following detailed syllabus, all objectives should be understood to be pre-fixed by the words **"At the end of the instruction, the learner should be able to……".** In the third

column, of the syllabus table, L:T:P denotes the number of instructional hours devoted to lectures, tutorials and practical (or Workshops) respectively.

	Learning Outcomes	**L: T: P**	**IMO Model Course Reference (Function 1) Remarks**
A	**PLAN A VOYAGE AND CONDUCT NAVIGATION**	**6:6:0**	**1.1**
1	VOYAGE PLANNING AND NAVIGATION FOR ALL CONDITIONS		**(As per IMO Model Course 7.01 'Master and Chief Mate' 2014 edition)**
1.1	Voyage planning and navigation for all conditions by acceptable methods of plotting ocean tracks		
1.2	Navigation and monitoring of the voyage		
1.3	Log books and voyage records		
1.4	Routeing in accordance with the general provisions on Ship's Routeing		
1.5	Reporting in accordance with the general provisions for Ship Reporting Systems and with VTS procedures		
B	**DETERMINE POSITION AND THE ACCURACY OF RESULTANT POSITION FIX BY ANY MEANS**	**8:22:0**	**1.2**
2	POSITION DETERMINATION IN ALL CONDITIONS		
2.1	Celestial observations		
2.2	Terrestrial observations, including the ability to use appropriate charts, notices to mariners and other publications to assess the accuracy of the resulting fix		

C	**CO-ORDINATE SEARCH AND RESCUE OPERATIONS**	**2:2:0**	**1.4**
3	IAMSAR Volume III		
D	**CALCULATION OF TIDAL CONDITIONS**	**2:4:0**	**1.8**
4.1	Ability to calculate tidal conditions		
4.2	Appropriate nautical publications on tides and current		
E	**MAINTAIN SAFE NAVIGATION THROUGH THE USE OF INFORMATION FROM NAVIGATION EQUIPMENT AND SYSTEMS TO ASSIST COMMAND DECISION MAKING**	**2:4:0**	**1.7**
5	Master's role in implementation of safe navigation using ECDIS		
F	**BEST MANAGEMENT PRACTICE AGAINST PIRACY AND RELATED INCIDENTS**	**1:2:0**	
6	Latest BMP guidance and amendments		
G	**LATEST UPDATES FROM IMO, MPA AND RELEVANT SIMILAR BODIES**	**1:3:0**	
7	Circulars and guidance for Safety of Navigation		
H	**Assessment**		
	CA1	**1:1:0**	
	CA2	**1:1:0**	
	EOC	**3:0:0**	
	Running Time	**27:45:0**	

SINGAPORE POLYTECHNIC

SINGAPORE MARITIME ACADEMY (SMA)

NAVIGATION PART B

Course(s): **COC 1&2 Deck**

Module Code / Name: MA 2020 / Navigation Part B

Instructional Hours

Lecture(s)	:	40 hours
Tutorial(s)	:	5 hours
Practical(s)	:	0 hours
Total	:	45 hours

Module Aims

To meet the mandatory minimum requirements for knowledge, understanding, proficiency and competence as defined in Table A – II/2 of STCW Code for the function Navigation at the Management Level in the Standards of Training, Certification and Watchkeeping for Seafarers as amended in 2010.

The syllabus covers the requirements of the STCW Code, Chapter II, Section A-II/2 of STCW2010 – namely, the knowledge, understanding, proficiency and training outcomes for the function of Navigation at Management Level - applicable to ships of 500 GT or more.

This part provides detailed knowledge to support the training outcomes, execution of tasks, duties and responsibilities in relation to:

- determining position and the accuracy of resultant position, by any means including the use of electronic means
- use of Modern Bridge Watch Keeping equipment and systems including electronic navigational aids, with specific knowledge of their operating principles, limitations, sources of error, detection of misrepresentation of information and methods of correction to obtain accurate position fixing
- knowledge of Voyage Data Recorders (VDRs) and Bridge Navigational Watch Keeping Alarm Systems (BNWAS)
- maintaining safe navigation through the use of information from navigation equipment and systems to assist command decision making
- maintaining the safety of navigation through the use of ECDIS
- manoeuvring and handling a ship using the parallel index technique

Teaching Methods

Instructions will be mainly undertaken through a series of lectures, tutorials, e-learning including Home Based Learning (HBL). The e-learning/HBL will require students to visit SP Library, log into the Internet (for information) and the Singapore Polytechnic intranet based Blackboard system

Means of Assessment

Assessment will be made in each part, at the end of the module (18th week), by a 3 hour combined written examination for Part A and Part B. Students will also be assessed on their performance in class separately for each part by various Class Assessments (CA). The CA (total of both parts- namely Part A and Part B) and the combined end-of-module examination will carry 25% and 75% weightage respectively. An overall pass %age of 60 in the full paper (Navigation) will be required before a student is declared to have passed the Module.

Assessment	Details	Remarks
CA1	15% - Part A	E Assessment, in Week 8
CA2	10% - Part B	Assignment
EOC	75%	60% Part A and 40% Part B (End of Course written paper of 3 hour duration)
Pass Marks	60%	Add CAs and EOC
Re-sit and Re-exam	100%	No CA component added

Recommended Texts, Videos, References & Web Sites

Will closely be (as necessary) in accordance to the recommended list in the IMO Model Course 7.01, Master and Chief Mate 2014 Edition. It is expected that the latest edition appropriate to the relevant references will be used.

Table of Specifications

Topics/GLOs	Total hours for each topic
A. Revision (Solid State Radar, Heading Speed and Distance Instruments, Echo Sounder, Virtual A to N)	5
B. Modern Electronic Navigational Aids - GNSS (including detailed GPS) - Augmentation Systems (D-GNSS, GBAS, SBAS) - E-LORAN - VDR & S-VDR - BNWAS - AIS - LRIT - INS & IBS	27
C. System errors and operational aspects	3
D. Parallel Indexing & Blind Pilotage Techniques	5
E. ECDIS	5
Total	45

Note :

In the following detailed syllabus, all General Learning Objectives (GLOs) should be understood to be pre-fixed by the words "At the end of the instruction, the learner should be able to……" In the third column, of the syllabus table, L: T: P denotes the number of instructional hours devoted to lectures, tutorials and practical respectively.

Please note that the contents of this document syallabus are in the GLOs format only. Details of the contents of each sub-headings is documented separately in the course document and follows closely the IMO Model Course 7.01, Master and Chief Mate 2014 Edition.

	Learning Outcomes	L : T : P	IMO Model Course Reference (Function 1) Remarks

A	**REVISION** (Errors & Limitations)
	- Radar (Solid State & Networked)
	- ARPA
	- Heading, Speed & Distance Instruments
	    - Doppler Log
	    - E/M Log
	    - Auto-Correlation Log
	- Determination of Depth
	- IMO / MPA Updates related to use of Nav Aids and related procedures
		5 : 0 : 0
		
		27 : 0 : 0
			(This is in addition to the IMO Model Course)
			
			1.3

B	**MODERN ELECTRONIC NAVIGATIONAL AIDS**
	- **Global Navigation Satellite Systems**
	    - NAVSTAR GPS
	    - GLONASS/GALILEO/COMPASS/IRNSS
	    - Operations, Limitations and Errors
			IMO Model Course 7.01, Master and Chief Mate 2014 Edition

	- **Augmentation Systems (D-GNSS, GBAS, SBAS)**
	    - Differential Systems
	    - GBAS
	    - SBAS
	        ▪ WAAS
	        ▪ EGNOS
	        ▪ GAGAN
	    - Operations & Limitations
			1.3

	- **E-LORAN**
	    - Basics of LORAN C
	    - Enhanced LORAN
	    - Operations & Limitations
			1.3

	- **AIS (Automatic Identification Systems)**
	    - Principles
	    - AIS Broadcast
	    - SAT AIS
	    - AIS based Virtual Aids		

1.3

- **LRIT (Long Range Identification and Tracking)**

  - LRIT systems
  - Information from LRIT transmissions
  - Ship-borne LRIT equipment
  - LRIT coverage in Latitudes above 70^0 1.4

- **INS (Integrated Navigation Systems & IBS (Integrated Bridge Systems**

  - Integrated Navigation & Integrated Bridge System
  - Integration and supporting safety of navigation
  - Limitations of the system 1.3

- **Voyage Data Recorders (VDR) & Simplified VDRs (S-VDR)**

  - VDR and S-VDR systems
  - VDR recordings
  - VDR & identifying the cause(s) of the incident using VDR data
  - Downloading and playback to an external computer
  - VDR Limitations

1.3

- **Bridge Navigation Watch Alarm System (BNWAS)**

  - Purpose of BNWAS
  - BNWAS alerts and alarms
  - BNWAS operations
  - BNWAS – Limitations

C SYSTEM ERRORS & OPERATIONAL ASPECTS 3: 0: 0 1.3

- **Understands Warnings in Navigational Aids**

  - Settings
  - Indication
  - Alarms

		0: 0: 5	1.10.1
D	**PARALLEL INDEXING & BLIND PILOTAGE TECHNIQUES** - Parallel indexing during coastal and channel navigation - "No-go" areas using safety lines - "Wheel-over" and "Settling-point" positions using advance and transfer values - "Cross track error" (CTE) safety lines for a given CTE - "Anchoring point" using CIR and Dead Range (DR) - Advantages, disadvantages and limitations of the parallel indexing technique		The syllabus reference is in accordance to the IMO Model Course 7.01, Master and Chief Mate 2014 Edition
E.	**ECDIS** - ENC - Carriage requirements - ECDIS and ECS - Sensors that are connected to a typical ECDIS - Safety depth and safety contour, AIO - Pure, dual fuel and multi-fuel mode in ECDIS operations - Datum mis-match in ECDIS - Limitations of ECDIS	5 : 0: 0	1.7
	Total Running Time	**40: 5: 0**	

SINGAPORE POLYTECHNIC
SINGAPORE MARITIME ACADEMY (SMA)

PRINCIPLES OF SHIP HANDLING AND SIMULATION

Course(s): **Class 2/1 Deck Preparatory Course**

Module Code / Name: MA 2022 / Principles of Ship Handling and Simulation

Instructional Hours

Lecture(s)	:	36 hours
Tutorial(s)	:	36 hours
Practical(s)	:	36 hours
Total	:	108 hours

Module Aims

To meet the mandatory competence requirements, as defined in Part A of the STCW Code in the Standards of Training, Certification and Watchkeeping for Seafarers as amended in 2010. As listed under Chapter II and Section A-II/2 of STCW2010, the knowledge, understanding and proficiency for the function of Navigation at Management Level applicable to ships of 500GT or more, is provided to support the execution of tasks, duties and responsibilities in relation to:

- Determine position and the accuracy of resultant position fix by any means
- Co-ordinate search and rescue operations
- Establish watch-keeping arrangements and procedures
- Maintain safe navigation through the use of information from navigational equipment and systems to assist in command decision making
- Maintain safe navigation through the use of ECDIS and associated navigation systems to assist command making decision
- Respond to navigational emergencies
- Manoeuvre and handle a ship in all conditions

Teaching Methods

Instructions will be undertaken through a series of lectures, tutorials and practical's. The tutorials will comprise of students groups discussions, followed by question and answer sessions. The practical will be held in the navigation simulator where students can practice and demonstrate the skills acquired.

Means of Assessment

Assessment of students will be based on Continuous Assessment (CA). They will be assessed as group sessions and class participations; and when performing their navigation simulation exercise. During the navigation simulator exercise the students are getting continuous feedback on their actions and performance from the staff in-charge as well during the de-briefing session after the exercise.

Recommended Texts, Videos, References & Web Sites

Will be in accordance to the recommended list in the IMO Model Course 7.01, Master and Chief Mate 2014 Edition. Naturally, the latest edition appropriate for the relevant modules will be used.

Table of Specifications

Topics	K	C	A	HA	Total
A. Manoeuvring and handling a ship in all conditions	10	10	30	10	60
B. Respond to Navigational Emergencies	10	10	10	10	40
Total	20	20	40	20	100

Note 1:
The letter K, C, A & HA in the table of specifications denotes the knowledge, comprehension, application and higher than application levels of Bloom's Taxonomy in the cognitive domain.

Note 2:
In the following detailed syllabus, all objectives should be understood to be pre-fixed by the words "At the end of the instruction, the learner should be able to……" In the third column, of the syllabus table, L: T: P denotes the number of instructional hours devoted to lectures, tutorials and practical or simulations respectively.

	Learning Outcomes	L : T : P	IMO Model Course Reference (Function 1) Remarks
A	**Manoeuvre and Handle a Ship in all Conditions** (Also refer to IMO model course 1.22, Ship simulator and bridge teamwork and STCW Reg. I/12)	26: 26: 36	1.10
1	**Manoeuvring and handling a ship in all conditions**		
1.1	Approaching pilot stations and embarking or disembarking pilots, with due regards to weather, side, head reach and stopping distances		
1.2	Handling a ship in rivers, estuaries and restricted waters, having regard to the effects of current, wind and restricted water on helm response		
1.3	Application of constant rate of turn techniques		
1.4	Manoeuvring in shallow water including the reduction in under-keel clearance caused by squat, rolling and pitching		
1.5	Interaction between passing ships and between own ship and nearby banks (canal effect)		
1.6	Berthing and unberthing under various conditions of wind, tide and current with and without tugs		
1.7	Ship and tug interaction		
1.8	Use of propulsion and manoeuvring systems including different types of rudder		
1.9	Types of anchor; choice of anchorage; anchoring with one or two anchors in limited anchorages and factors involved in determining the length of anchor cable to be used		
1.10	Procedures for anchoring in deep water and in shallow water		
1.11	Dragging anchor; clearing fouled anchors		
1.12	Dry-docking, both with and without damage		

1.13	Management and handling ships in heavy weather including assisting a ship or aircraft in distress; towing operations; means of keeping an unmanageable ship out of a sea trough, lessening lee drift and use of oil		
1.14	Precautions in manoeuvring to launch rescue boats and survival craft in bad weather		
1.15	Methods of taking on board survivors from rescue boats and survival craft		
1.16	Ability to determine the manoeuvring and propulsion characteristics of common types of ships, with special reference to stopping distances and turning circles at various draughts and speeds		
1.17	Importance of navigating at reduced speed to avoid damage caused due to own ship's bow and stern waves		
1.18	Practical measures to be taken when navigating in or near ice or in conditions of ice accumulation on board		
1.19	Use of, and manoeuvring in and near traffic separation schemes and in vessel traffic service (VTS) areas		
B	**Respond to Navigational Emergencies**	10: 10: 00	1.9
2	**Respond to navigational emergencies**		1.9.1
2.1	Precautions when beaching a ship		
2.2	Action to be taken if grounding is imminent and after grounding		
2.3	Refloating a grounded ship with and without assistance		
2.4	Action to be taken if collision is imminent and following a collision or impairment of the watertight integrity of the hull by any cause		
2.5	Assessment of damage control		
2.6	Emergency steering		
2.7	Emergency towing arrangements and towing procedures		
	Total Running Time	**36 : 36 : 36**	

SINGAPORE POLYTECHNIC
SINGAPORE MARITIME ACADEMY (SMA)

MARINE PLANT AND PROPULSION

Course(s): **Class 2/1 Deck Preparatory Course**

Module Code / Name: MA 2023 / Marine Plant and Propulsion

Instructional Hours

Lecture(s)	:	27 hours
Tutorial(s)	:	18 hours
Practical(s)	:	-
Total	:	45 hours

Module Aims

To meet the mandatory competence requirements, as defined in Part A of the STCW Code in the Standards of Training, Certification and Watchkeeping for Seafarers as amended in 2010. As listed under Chapter II and Section A-II/2 of STCW2010, the knowledge, understanding and proficiency for the function of Navigation at Management Level applicable to ships of 500GT or more, is provided to support the execution of tasks, duties and responsibilities in relation to:

- Understanding operating principles of Marine Power Plants
- Ships' auxiliary machinery
- General Knowledge of Marine Engineering Systems

Teaching Methods

Instructions will be undertaken through a series of lectures, elearning, and simulator visits. The elearning will require students to visit Singapore Polytechnic intranet system, followed by visits to the engine room simulator at the Integrated Simulation Centre at Singapore Polytechnic. The simulation visit will provide students with an understanding on the operation machineries in the engine room.

Means of Assessment

There will be two written assessments – Term test and Semestral examination. Term test will be 25% and the Semestral examination 75%. Total 100%.

Recommended Texts, Videos, References & Web Sites

In accordance to the recommended list in the IMO Model Course 7.01, Master and Chief Mate 2014 Edition. The latest edition appropriate for the relevant modules to be used.

Table of Specifications

Topics/GLOs	Total hours for each topic
A. Operating Principles of Marine Power Plants	19
B. Ship Auxiliary Machinery	18
C. General Knowledge of Marine Engineering Systems	
• Marine Engineering Terms and fuel consumption	4
• Arrangements necessary for appropriate and effective engineering watches to be maintained for the purposes of safety under normal circumstances and UMS operations	2
• Arrangements necessary to ensure a safe engineering watch is maintained when carrying dangerous cargo.	2
Total	45

Note :
In the following detailed syllabus, all objectives should be understood to be pre-fixed by the words "At the end of the instruction, the learner should be able to……" In the third column, of the syllabus table, L: T: P denotes the number of instructional hours devoted to lectures, tutorials and practical or simulations respectively.

Please note that the contents of this syallabus are in all in sub-headings. Details of the contents of each sub-headings follow closely to the IMO Model Course 7.01, Master and Chief Mate 2014 Edition.

	Learning Outcomes	L : T : P	IMO Reference
A	**OPERATING PRINCIPLES OF MARINE POWER PLANTS**		**1.11.1**
	Operating principles of marine power plants - Main Engine and generators - Steam Turbine Systems - Gas Turbine System - Propeller and propeller shaft	10 : 8 : 0	The syllabus reference will be in accordance to recommended list in the IMO Model Course 7.01, Master and Chief Mate 2014 Edition
B	**SHIP'S AUXILIARY MACHINERY** - Boilers - Distillation and fresh-water systems - Pumps and pumping systems - Steering gears - Generators, alternators and electrical distribution - Refrigeration, air-conditioning and ventilation - Stabilizers - Sewage treatment plants	10 : 8 : 0	**1.11.2** *added in as per IMO requirements

- Oily water separator and oil filtering equipment
- Incinerators
- Deck machinery
- Hydraulic systems

C	**MARINE ENGINEERING TERMS AND FUEL CONSUMPTION**	7 : 2 : 0	**1.11.3**

- Engineering terminology on ships and what they meant
- Ship's fuel consumptions
- Arrangements necessary for appropriate and effective engineering watches to be maintained for the purpose of safety under normal circumstances and UMS operations
- Arrangements necessary to ensure a safe engineering watch is maintained when carrying dangerous cargo.

Total Running Time **27 : 18: 0**

SINGAPORE POLYTECHNIC
SINGAPORE MARITIME ACADEMY

CARGO WORK

Course(s):	**Class 2/1 Deck Preparatory Course**
Module Code / Name:	MA 2024 / Cargo Work

Instructional Hours

Lecture (L):	63
Tutorial (T):	45
Practical (P):	Nil
Total:	108
Credit Units:	NA

Module Aims

On completion of this module the students will be prepared for taking full responsibility of the ship with regards to the safety of the ships and its cargo. They will be aware of their obligations under international agreements and convention concerning the safety and the protection of the marine environment. They will be able to plan and ensure safe loading, stowage, securing and care during voyage and unloading of cargoes.

Teaching Methods / Learning Tasks

The module is delivered through a combination of lecture, tutorial and group presentation. These lectures and tutorial will provide students with a thorough knowledge and, understanding of principles and statutory rules and regulation for cargo work operation on board vessel.

Means of Assessment

The assessment for this module has the following components:

1.	Term Test	25%
2.	EOC Exam	75%

Recommended Text (Latest edition)

1. Cargo work by Kemp & Young
2. Cargo work for maritime operations / D.J. House
3. ISGOTT
4. IMDG Code
5. SOLAS Consolidated edition

6. Liquefied gas handling principles on ships and in terminals/ [Graham] McGuire and [Barry] White.
7. Chemical Tanker Operations for the STCW Advanced Training Course
8. IBC Code : international code for the construction and equipment of ships carrying dangerous chemicals in bulk / International Maritime Organization.
9. IGC code : international code for the construction and equipment of ships carrying liquefied gases in bulk.

Table of Specifications

Topics		Abilities (%)			Total (%)
		K	C	A/HA	
A	PLAN & ENSURE SAFE LOADING, STOWAGE, SECURING, CARE DURING THE VOYAGE AND UNLOADING OF CARGOES	35	35	5	75
B	CARRIAGE OF DANGEROUS GOODS	10	10	5	25
Total		45	45	10	100
Infusion of SP Core Values:					

Notes:

1. The letters K, C, A/HA in the table of specifications denote respectively, the Knowledge, Comprehension, and Application/Higher than Application levels of Bloom's Taxonomy in the cognitive domain.
2. In the detailed syllabus which follows:
   - all objectives should be understood to be prefixed by the words: "At the end of instruction, the learner should be able to…"
   - L: T: P: DLT denotes lecture hours, tutorial hours, practical hours and equivalent directed learning time respectively.

A. IMO 2.1 PLAN & ENSURE SAFE LOADING, STOWAGE, SECURING, CARE DURING THE VOYAGE AND UNLOADING OF CARGOES

S.No	Learning outcomes	L	T	IMO sub para
1.	**STOWAGE AND SECURING OF CARGOES ON BOARD SHIP, CARGO HANDLING GEAR AND SECURING AND LASHING EQUIPMENT**			**2.1.4**
1.1.	• Timber deck cargoes	2.0	1.5	2.1.4.1
1.2.	• Procedures for receiving and delivering Cargo	2.0	1.5	2.1.4.2
1.3.	• Care of cargo during Carriage	2.0	1.5	2.1.4.3
1.4.	• Requirements applicable to cargo handling gear	4.0	4.0	2.1.4.4
1.5.	• Maintenance of cargo gear	3.0	0.5	2.1.4.5
1.6.	• Maintenance of hatch covers	2.0	1.5	2.1.4.6
2.	**LOADING AND UNLOADING OPERATIONS, WITH SPECIAL REGARD TO THE TRANSPORT OF CARGOES IDENTIFIED IN THE CODE OF SAFE PRACTICE FOR CARGO STOWAGE AND SECURING**			**2.1.5**
2.1.	• Loading, stowage and discharge of heavy weights.	2.0	1.5	2.1.5.1
2.2.	• Care of cargo during carriage	2.0	1.5	2.1.5.2
2.3.	• Methods and safeguards when Fumigating Holds	2.0	1.5	2.1.5.3
3.	**GENERAL KNOWLEDGE OF TANKERS AND TANKER OPERATIONS**			**2.1.6**
3.1.	Terms and definitions	2.0	1.0	2.1.6.1
3.2.	• Contents and application of the International Safety Guide for Oil Tankers and Terminals. (ISGOTT)	3.0	1.5	2.1.6.2
3.3.	• Oil tanker operations and related pollution prevention regulations.	2.0	1.5	2.1.6.3
3.4.	• Chemical Tankers	3.0	2.0	2.1.6.4
3.5.	• Tank cleaning and control of pollution in chemical tankers.	2.0	1.5	2.1.6.5
3.6.	• Gas tankers	3.5	2.0	2.1.6.6
3.7.	• Cargo operations in gas tankers	2.5	2.0	2.1.6.7
4.	**KNOWLEDGE OF THE OPERATIONAL AND DESIGN LIMITATIONS OF BULK CARRIERS**			**2.1.7**
4.1.	• **Operational and design limitations of bulk carriers**	2.0	1.5	2.1.7.1
4.2.	• SOLAS, chapter XII Additional safety measures for bulk carriers	1.0	0.5	2.1.7.2

S.No	Learning outcomes	L	T	IMO sub para
4.3.	• CSR Bulk			2.1.7.3
5.	**LOADING, CARE AND UNLOADING OF BULK CARRIERS**			**2.1.8**
5.1.	• Application of all available shipboard data related to loading, care and unloading of bulk cargoes	4.0	3.0	2.1.8.1
5.2.	• Code of practice for the safe loading and unloading of bulk carriers (BLU Code)			2.1.8.2
6.	**SAFE CARGO HANDLING IN ACCORDANCE WITH THE PROVISIONS OF THE RELEVANT INSTRUMENTS**			**2.1.9**
6.1.	• Establish procedures for safe cargo handling in accordance with the provisions of the relevant instruments such as; - IMDG Code - IMSBC Code - MARPOL 73/78, Annexes III and V -	2.0	1.5	2.1.9.1
7.	**EFFECTIVE COMMUNICATIONS AND IMPROVING WORKING RELATIONSHIPS**			**2.1.10**
7.1.	• Basic principles for establishing effective communications and improving working relationships between ship and terminal personnel			2.1.10.1

B. IMO 2.3 CARRIAGE OF DANGEROUS GOODS

8.	**INTERNATIONAL REGULATIONS, STANDARDS, CODES INCLUDING THE INTERNATIONAL MARITIME DANGEROUS GOODS (IMDG) CODE AND THE INTERNATIONAL MARITIME SOLID BULK CARGOES (IMSBC) CODE AND RECOMMENDATIONS ON CARRIAGE OF DANGEROUS CARGOES**			**2.3.1**
8.1.	• International Regulations and Codes	2.0	2.0	2.3.1.1
9.	**CARRIAGE OF DANGEROUS, HAZARDOUS AND HARMFUL CARGOES; PRECAUTIONS DURING LOADING AND UNLOADING AND CARE DURING THE VOYAGE OF DANGEROUS, HAZARDOUS AND HARMFUL CARGOES**			**2.3.2**
9.1.	• Dangerous goods in packages	3.0	2.0	2.3.2.1
9.2.	• Solid bulk cargoes	6.0	4.0	2.3.2.2
9.3.	• International Code for the Safe Carriage of Grain in Bulk (International Grain Code)	4.0	4.0	2.3.2.3
	Total	**63.0**	**45.0**	

SINGAPORE POLYTECHNIC
SINGAPORE MARITIME ACADEMY

MARITIME LAW AND PERSONNEL MANAGEMENT

Course(s):	**Class 2/1 Deck Preparatory Course**
Module Code / Name:	MA 2026 / Maritime Law and Personnel Management

Instructional Hours

Lecture	:	36 hours
Tutorial	:	27 hours
Total	:	63 hours

Module Aims

This module aims to meet the mandatory minimum requirements for knowledge, understanding and proficiency in Table A-II/2 of STCW Convention for the function of International Maritime Law and Personnel Management at the Management Level as per IMO Model Course 7.01 2014 Edition.

Teaching Methods

Instructions will be undertaken through a combination of lectures and tutorials.

Means of Assessment

There will be two written examinations. One is a Term Test with a 25% weightage and the other is an End-of-Course at the end of the Semester with a 75% weightage.

Reference Text

1. Merchant Shipping Act of Singapore (Chapter179)
2. Maritime & Port Authority of Singapore Act (Chapter 170A)
3. Prevention of Pollution of the Sea Act (Chapter 243)
4. STCW Convention and STCW Code (2011 Edition)
5. Merchant Shipping (Safety Convention) Regulations 1984

Special Requirements

1. None.

Table of Specifications

Abilities/Topics	K	C	A	HA	Total
A. Certificates and other documents required to be carried on board ships by International Conventions	2	1	1	0	4
B. Responsibilities under the relevant requirements of the International Convention on Load Lines	2	1	1	0	4
C. Responsibilities under the relevant requirements of the International Convention for the Safety of Life at Sea	2	1	1	0	4
D. Responsibilities under the International Convention for the Prevention of Pollution from Ships, 1973, and the Protocol of 1978 relating thereto (MARPOL 73/78)	2	1	1	0	4
E. Maritime declaration of health and the requirements of the International Health Regulations	1	1	0	0	2
F. Responsibilities under other international maritime law embodied in international agreements and conventions that impact on the role of management level deck officers					
i. Maritime Labour Convention	3	2	2	0	7
ii. Collision	3	3	2	0	8
iii. Assistance and Salvage	2	2	1	0	5
iv. Limitation of Liability	3	3	1	0	7
v. Classification Societies	2	2	1	0	5
vi. Carriage of Goods by Sea	5	5	3	0	13
vii. General Average and Marine Insurance	4	4	2	0	10
viii. Law of the Sea	4	4	2	0	10
G. Methods and Aids to Prevent Pollution of the Marine Environment by Ships	3	2	1	0	6
H. Related International Maritime Conventions and National Legislation	4	4	3	0	11
Total %	42	36	22	0	100

Note 1: The letter K, C, A and HA in the table of specifications denote the knowledge, comprehension, application and higher than application levels of Bloom's Taxonomy in the cognitive domain.

Note 2: In the following detailed syllabus, all objectives should be understood to be prefixed by the words "At the end of instruction, the learner should be able to...". In the second column, L:T:P denotes the number of instructional hours devoted to lectures, tutorials and practical (or workshops) respectively.

	Learning Outcomes	L : T : P	IMO Reference
	MONITOR AND CONTROL COMPLIANCE WITH LEGISLATIVE REQUIREMENTS		IMO 3.2.1
1.	**International Maritime Law Embodied in International Agreements and Conventions**		Model Course 7.01 2014 Edition
1.1	Certificates and other documents required to be carried on board ships by International Conventions	1: 1: 0	R110
1.2	Responsibilities under the relevant requirements of the International Convention on Load Lines	1: 1: 0	R53, R78
1.3	Responsibilities under the relevant requirements of the International Convention for the Safety of Life at Sea	1: 1: 0	R2
1.4	Responsibilities under the International Convention for the Prevention of Pollution from Ships, 1973 and the Protocol of 1978 relating thereto (MARPOL 73/78)	1: 1: 0	R9, R10, R11, R12, R13, R26, R27, R28, R72, F73, R74
1.5	Maritime declaration of health and the requirements of the International Health Regulations	1: 1: 0	R104
1.6	Responsibilities under other international maritime law embodied in international agreements and conventions that impact on the role of management level deck officers		
	- Maritime Labour Convention (MLC 2006)	3: 2: 0	R104
	- International Convention for the Unification of Certain Rules of Law with Respect to Collision Between Vessels (Collision, 1910)	3: 2: 0	R8, R15, R16
	- International Convention on Salvage, 1989 (The London Salvage Convention)	3: 2: 0	R21
	- Convention on Limitation of Liability for Maritime Claims, 1976 (LLMC 1976)	3: 2: 0	R105
	- Classification societies	1: 1: 0	
	- Carriage of goods by sea	3: 2: 0	
	- General average and marine insurance	4: 3: 0	
	- United Nations Convention on the Law of the Sea (UNCLOS)	3: 3: 0	R75
1.7	Methods and aids to prevent pollution of the marine environment by ships	2: 1: 0	

	-	Convention of the Prevention of Marine Pollution by Dumping of wastes and other matter (London Dumping Convention) (LDC 1972)	R106
	-	International Convention relating to Intervention on the High Seas in cases of Oil Pollution Casualties, 1979 (Intervention)	R107
	-	International Convention on Civil Liability for Oil Pollution Damage, 1969 (CLC 1969)	R108
1.8		National legislation for implementing international agreements and conventions, case studies, IMO and MPA updates	6: 4: 0
		Total Running Time	**36: 27: 0**

SINGAPORE POLYTECHNIC
SINGAPORE MARITIME ACADEMY

METEOROLOGY

Course(s):	Master & Chief Mate (Management Level)
Module Code:	MA2027

Instructional Hours

Lecture (L):	18
Tutorial (T):	0
Total:	18

Module Aims

To provide students with theoretical and working knowledge required for deck officers of management level in maritime meteorology, so as to enhance the safe operation of the ship.

Teaching Methods / Learning Tasks

Instruction will take place through classroom lectures that will provide students with foundation knowledge and key concepts.

Means of Assessment

The assessment for this module has the following components:

1.	Term Test	25%
2.	EOC Exam	75%

Recommended Text and References

1. *Meteorology for Seafarers* by Lt-Cmdr R.M. Frampton and P.A. Uttridge, – Brown, Son & Ferguson, UK.

2. *The Mariner's Handbook* (NP 100) by UK Hydrographic Department, – Hydrographer of the Navy.

3. *Ocean Passages of the World* (NP 136-1&2) by UK Hydrographic Department, Edition- Hydrographer of the Navy.

4. *Meteorology for Mariners* (Met.O. 895) by UK Met Office, – HMSO

Special Requirements (if any)

Nil

Table of Specifications

Topics	Abilities (%)			Total (%)
	K	C	A/HA	
A. Synoptic charts & weather forecasting	10	10	8	28
B. Characteristics of various weather systems	18	16	14	48
C. Ocean Current Systems	12	6	6	24
*Infusion of SP Core Values: Integrity, responsibility and openness are encouraged in teamwork during design discussion.				

Notes:

1. The letters K, C, A/HA in the table of specifications denote respectively, the Knowledge, Comprehension, and Application/Higher than Application levels of Bloom's Taxonomy in the cognitive domain.
2. In the detailed syllabus which follows:
   - all objectives should be understood to be prefixed by the words: "At the end of instruction, the learner should be able to…"
   - L: T: P: DLT denotes lecture hours, tutorial hours, practical hours and equivalent directed learning time respectively.

Detailed Syllabus: As per IMO Model Course 7.01 2014 edition

	Learning Outcomes	L	:	T	:	P
1.8.1	**SYNOPTIC CHARTS AND WEATHER FORECASTING**	2.0		-		-
1.1	Synoptic and prognostic charts and forecast from any source					
1.2	Range of information available	1.0		-		-
1.3	Weather Forecasting	0.5		-		-
1.8.2	**CHARACTERISTIC OF VARIOUS WEATHER SYSTEM**	3.0		-		-
2.1	Tropical revolving storms (TRS)					
2.2	Main types of floating ice, their origins and movements	2.5		-		-
2.3	Guiding principles relating to the safety of navigation in ice	1.0		-		-
2.4	Conditions leading to ice accretion on ship's superstructures, dangers and the remedies available	1.5		-		-
1.8.3	**OCEAN CURRENT SYSTEMS**	2.5		-		-
3.1	Surface water circulation of the ocean and principal adjoining seas					
3.2	Voyage planning principles with respect to weather conditions and wave height	2.0		-		-
3.3	Formation of sea waves and swell waves	1.0		-		-
4.0	Case Studies / IMO and MPA updates	1.0		-		-
	Total Running Time:	18	:	00	:	00

SINGAPORE POLYTECHNIC
SINGAPORE MARITIME ACADEMY

COMPASS

Course(s):	**Class 2/1 Deck Preparatory Course**
Module Code:	MA 2028

Instructional Hours

Lecture (L):	27
Tutorial (T):	0
Practical (P):	Nil
Total:	27
Credit Units:	NA

Module Aims

To provide students with theoretical and working knowledge required for deck officers of management level in the magnetic compass and gyrocompass, so as to enhance the safe operation of the ship.

Teaching Methods / Learning Tasks

Instruction will take place through classroom lectures that will provide students with foundation knowledge and key concepts.

Means of Assessment

There will be a Mid Semester Test of 25% weightage and End of course examinations of 75% weightage at the end of the semester.

Recommended Text (Latest edition)

1. *Ship Magnetism & Magnetic Compass* by F G Merrifield , Pergamon Press, London.
2. *The Ship's Compass* by Grant Klinkert , Routledge and Kegan Paul, London.
3. Joseph, T., & Rewari, S. *Ship's magnetic compass*. New Delhi: Applied Research International.
4. Kemp, J.F. and Young, P. *Notes on Compass Work*. 2nd ed. London, Stanford Maritime
5. Assembly resolution A.424(XI) – Performance Standards for Gyrocompasses
6. Assembly resolution A.382(X) – Magnetic Compasses: Carriage and Performance

Special Requirements

1. Magnetic Compass with Binnacle.
2. Correctors (Permanent and Soft Iron).
3. Azimuth Mirror and Pelorus.

Table of Specifications

Topics		Abilities (%)			Total (%)
		K	C	A/HA	
A	A. Principles & Errors of Magnetic Compasses B. Principles and Errors of Gyrocompasses C. Systems Controlled by the Master Gyro	45	45	10	100
	Total	45	45	10	100
Infusion of SP Core Values:					

Notes:

1. The letters K, C, A/HA in the table of specifications denote respectively, the Knowledge, Comprehension, and Application/Higher than Application levels of Bloom's Taxonomy in the cognitive domain.
2. In the detailed syllabus which follows:
   - all objectives should be understood to be prefixed by the words: "At the end of instruction, the learner should be able to…"
   - L: T: P: DLT denotes lecture hours, tutorial hours, practical hours and equivalent directed learning time respectively.

Learning outcomes:

IMO 1.3 DETERMINE AND ALLOW FOR COMPASS

		L	T	IMO competence
1.0	Principles of the Magnetic Compass and their Correction	6	0	1.3
2.0	Principles and Errors of Gyro Compass	16.5	0	
3.0	Systems under the Control of the Master Gyro and the Operation and care of the main types of Gyrocompass	1.5	0	
	Assessment	3	0	
	Total Curriculum Hours	**27**	**0**	

SINGAPORE POLYTECHNIC
SINGAPORE MARITIME ACADEMY

SHIP STABILITY

Course(s): **COC 2&1 Deck**

Module Code / Name: MA 2029 / Ship Stability

Instructional Hours

Lecture	:	27 hours
Tutorial	:	45 hours
Total	:	72 hours

Module Aims

To provide students with the knowledge, understanding and application to conduct themselves as management level Ship Officers in the areas of safety and ship stability during ship's operations at sea, in port and during dry-docking.

Teaching Methods

A varied teaching strategy and methods will be applied such as lectures, tutorials, self-learning, library/journal research and reading.

Means of Assessment

Learning outcomes will be assessed based on examinations. This could be in the form of class test, and Semesteral Examination.

There will be a Mid Semester Test of 25% weightage and End of course examinations of 75% weightage at the end of the semester.

Recommended Text (Latest editions)

1. Derrett, D.R. Ship Stability for Masters and Mates
2. Klass van Dokkum, Hans ten Katen, Kees Koomen, Jakob Pinkster - Ship Stability

Reference Text

1. International Code on Intact Stability - IMO
2. International Convention for Load Lines, 1966 , as amended
3. IMO Assembly resolution A 513(13) – Amendments to the International Convention on Load Lines, 1966

Special Requirements

1. Nil

Table of Specifications

Module Name	Abilities/Topics	K	C	A	HA	Total
Ship Stability	A.1 Fundamental Principles of Trim and Stability	22	22	31		75
	A.2 Effect on Trim and Stability in the Event of Damage and Flooding	4	4	6		14
	A.3 IMO Recommendations Concerning Ship Stability	1	1	2		4
	B.1 Effect on Trim and Stability of Cargoes and Cargo Operations	2	2	1		5
	B.2 Stability and Trim Diagrams and Stress Calculating Equipment	1	1	0		2
kl	Total %	30	30	40		100

Note 1: The letter K, C, A and HA in the table of specifications denote the knowledge, comprehension, application and higher than application levels of Bloom's Taxonomy in the cognitive domain.

Note 2: In the following detailed syllabus, all objectives should be understood to be prefixed by the words "At the end of instruction, the learner should be able to...". In the second column, L:T:P denotes the number of instructional hours devoted to lectures, tutorials and practical (or workshops) respectively.

	Learning Outcomes	L: T: P	IMO Ref / Remarks
A.1	CONTROL TRIM, STABILITY AND STRESS		IMO Ref No Competence 3.1
1	FUNDAMENTAL PRINCIPLES OF TRIM AND STABILITY		IMO Ref No. 3.1.1
	Know how to calculate areas and volumes by Simpson's Rules	2: 4: 0	
2	Understand the effect of density on ship's draught	2: 3: 0	
3	Understand stability at moderate and large angles of heel	2: 3 : 0	
4	Use Simplified Stability Data	1: 2: 0	
5	Evaluate Trim and List	2: 4: 0	
6	Understand Dynamical Stability	1: 2: 0	
7	Estimate GM by Means of Rolling Period Tests	1: 3: 0	
8	Know the Recommendation on Intact Stability for Passenger and Cargo Ships under 100 Metres in length	2: 3: 0	
9	Understand Intact Stability Requirements for the Carriage of Grain	1: 3: 0	
10	Understand Rolling of Ships Calculations	1: 2: 0	
11	Evaluate the Effect of Dry-Docking and Grounding on a Ship's Stability	2: 3: 0	
12	Evaluate Shear Force, Bending Moments and Torsional Stress	2: 3: 0	
A.2	EFFECT ON TRIM AND STABILITY IN THE EVENT OF DAMAGE AND FLOODING		IMO Ref No. 3.1.2
13	Evaluate the Effect of Flooding an Transverse Stability	2: 4: 0	
14	Evaluate the Effect of Flooding on Trim	1: 3: 0	

15	Understand Theories Affecting Trim and Stability	1: 2: 0	
A.3	IMO RECOMMENDATIONS CONCERNING SHIP STABILITY		
16	Know Responsibilities under the International Conventions and Codes PLAN AND ENSURE SAFE LOADING, STOWAGE, SECURING, CARE DURING THE VOYAGE AND UNLOADING CARGOES	1: 1: 0	IMO Ref No. 3.1.3 IMO Ref No Competence 2.1
B.1	EFFECT ON TRIM AND STABILITY OF CARGOES AND CARGO OPERATIONS		IMO Ref No. 2.1.2
17	Understand the Effect of Cargo Operations on Draught, Trim and Stability	1:0: 0	
B.2	STABILITY AND TRIM DIAGRAMS AND STRESS CALCULATING EQUIPMENT		
18	Evaluate the Shear Forces, Bending Moments and Torsional Moments	1: 0: 0	IMO Ref No. 2.1.3
19	Understand Compliance with the Minimum Freeboard Requirements of the Load Line Regulations	1: 0: 0	
	Total running hours	**27:45:00**	

SINGAPORE POLYTECHNIC
SINGAPORE MARITIME ACADEMY

SHIP CONSTRUCTION

Course(s): Master & Chief Mate (Management Level)

Module Code: MA2030

Instructional Hours

Lecture (L):	27
Tutorial (T):	18
Laboratory / Workshop (P):	nil
Total:	45

Module Aims

To provide students with the knowledge, understanding and application to conduct themselves as management level Ship Officers in the areas of ship construction and include the ability to supervise mandatory surveys and to prepare a vessel for dry-docking.

Teaching Methods / Learning Tasks

A varied teaching strategy and methods will be applied such as lectures, tutorials, self-learning, library/journal research and reading.

Means of Assessment

The assessment for this module has the following components:

1.	Term Test	25%
2.	EOC Exam	75%

Recommended Text (Latest editions)

1. Eyres, D. J. Ship Construction, London, Buttorworth-Heinemann
2. Taylor, D.A. Merchant Ship Construction. London, Institute of Marine Engineers

References

1. International Convention for Load Lines, 1966 (IMO Sales No. 701)

Special Requirements (if any)

Nil

Table of Specifications

Topics	Abilities (%)			Total (%)
	K	C	A/HA	
A. Fundamental Principles of Ship Construction	55	25	10	90
B. Loadlines & Freeboard	5	5	0	10
Total	60	30	10	100
*Infusion of SP Core Values: Integrity, responsibility and openness are encouraged in teamwork during design discussion.				

Notes:

1. The letters K, C, A/HA in the table of specifications denote respectively, the Knowledge, Comprehension, and Application/Higher than Application levels of Bloom's Taxonomy in the cognitive domain.
2. In the detailed syllabus which follows:
   - all objectives should be understood to be prefixed by the words: "At the end of instruction, the learner should be able to…"
   - L: T: P: DLT denotes lecture hours, tutorial hours, practical hours and equivalent directed learning time respectively.

Detailed Syllabus (as per IMO Model Course 7.01)

	Learning Outcomes	L	:	T	:	P	IMO
A	**FUNDAMENTAL PRINCIPLES OF SHIP CONSTRUCTION**						
1	**Understand Shipbuilding Materials**	**4**	**:**	**2**	**:**	**0**	**1.1**
2	**Understands welding techniques**	**2**	**:**	**2**	**:**	**0**	**1.2**
3.0	**Know the Functions of Bulkheads**	**2**	**:**	**2**	**:**	**0**	**1.3**
4.0	**Know the Requirements for Watertight and Weathertight Doors**	**2**	**:**	**2**	**:**	**0**	**1.4**
5.0	**Understand Corrosion and its Prevention**	**3**	**:**	**1**	**:**	**0**	**1.5**
6.0	**Knows methods to avoid the detrimental effects that corrosion can have on bulk carriers**	**1**	**:**	**1**	**:**	**0**	
7.0	**Know Surveys and Dry-docking Requirements**	**4**	**:**	**2**	**:**	**0**	**1.6**
8.0	**Knows operational and design limitations of bulk carriers**	**2**	**:**	**1**	**:**	**0**	**7.1**
9.0	**Knows Common structural rules (CSR) for bulk carriers and tankers**	**1**	**:**	**1**	**:**	**0**	**7.2**
10.0	**Knows the limitations on strength of the vital constructional parts of a standard bulk carrier**	**1**	**:**	**2**	**:**	**0**	**7.3**
B	**LOADLINES & FREEBOARD**						**Comp 3.2**
11.0	**Understands the International Load Line Convention**	**4**	**:**	**2**	**:**	**0**	**1.2**
	Term Test	1	:	0	:	0	

[Note: Indicating the time for assessment separately is optional. Time for assessment may be subsumed into the nominal time for the respective topics.]

Total Running Time: 27 : 18 : 0