

**ANNEX B OF CMO NO. 20, SERIES OF 2015
BACHELOR OF SCIENCE IN MARINE ENGINEERING
COURSE SPECIFICATIONS**

Course Code	:	Mar Env
Course Descriptive Title	:	Protection of the Marine Environment
Course Credits	:	3 units
Lecture Contact Hours per Week	:	3 hours
Laboratory Contact Hours per Week	:	0 hours
○ Prerequisite	:	None
Reference/s	:	<ul style="list-style-type: none"> ○ Table A-III/1 Function: Controlling the Operation of the Ship and Care for Persons on Board ○ STCW'78 as amended ○ Marine Pollution ○ IMO Model Course 1.35 ○ Annex A of CMO No. 20, Series of 2015 (Curriculum Mapping for BSMarE)

COMPETENCE	KNOWLEDGE, UNDERSTANDING AND PROFICIENCY	PERFORMANCE	APPROX HOURS
Ensure compliance with pollution prevention requirements	Prevention of pollution of the marine environment	1. International Convention for the Prevention of Pollution from Ships, 1973 and the Protocol of 1978 relating thereto (MARPOL 73/78)	14 Hours
	Knowledge of the precautions to be taken to prevent pollution of the marine environment	Technical Annexes: Annex I to VI of MARPOL 73/78 in detail <ul style="list-style-type: none"> - Defines, for the purpose of MARPOL 73/78: - Harmful substance - Discharge - Ship - Incident - States that violations of the Convention are prohibited and that sanctions should be established for violations, wherever they occur by the Administration of the ship concerned - Describes the inspections which may be made by port State authorities and outlines actions which they may take - Describes the provisions for the detection of violations and enforcement of the Convention - States that reports on incidents involving harmful substances must be made without delay 	
Ensure compliance with pollution prevention requirements (Cont)	Knowledge of the precautions to be taken to prevent pollution of the marine environment (Cont)	2. Annex I-Oil <ul style="list-style-type: none"> - Defines, for the purposes of Annex I: - Oil - Oily mixture - Oil fuel - Oil tanker - Combination carrier - Nearest land - Special area - Instantaneous rate of discharge of oil content - Wing tank - Centre tank - Slop tank - Clean ballast - Segregated ballast - Describes the surveys and inspections required under the provisions of MARPOL 73/78 	

COMPETENCE	KNOWLEDGE, UNDERSTANDING AND PROFICIENCY	PERFORMANCE	APPROX HOURS
Ensure compliance with pollution prevention requirements (Cont)	Knowledge of the precautions to be taken to prevent pollution of the marine environment (Cont)	<ul style="list-style-type: none"> - Describes the steps which may be taken if a surveyor finds that the condition of the ship or its equipment is unsatisfactory - States that the condition of the ship and its equipment should be maintained to conform with the provisions of the Convention - States that the certificate issued after survey is the International Oil Pollution Prevention (IOPP) Certificate - Ensure Compliance with Pollution-Prevention Requirements - States that the IOPP Certificate should be available on board the ship at all times - Lists the conditions under which oily mixtures may be discharged into the Sea from an oil tanker - Lists the conditions under which oily mixtures from machinery-space bilges may be discharged into the sea - States that the provisions do not apply to the discharge of clean or segregated ballast - Describes the conditions under which the provisions do not apply to the discharge of oily mixtures from machinery spaces where the oil content without dilution does not exceed 15 parts per million - States that residues which cannot be discharged into the sea in compliance with the regulations must be retained on board or discharged to reception facilities - States the special areas for the purposes of Annex I - States that any discharge into the sea of oil or oily mixtures from an oil tanker or other ships of 400 tons gross tonnage and above is prohibited while in a special area - Describes the conditions under which an oil tanker may discharge oily mixtures through ODMCS - Describes the conditions under which a ship, other than an oil tanker, may discharge oily mixtures in a special area - States that the regulation does not apply to the discharge of clean or segregated ballast - Describes conditions in which processed bilge water from machinery spaces may be discharged in a special area - Describes the exceptional circumstances in which the regulations on the discharge of oil or oily mixtures do not apply - States that ballast water should not normally be carried in cargo tanks of tankers provided with segregated ballast tanks - Explains the exceptions in which ballast may be carried in cargo tanks - States that every oil tanker operating with crude oil washing systems should be provided with an Operations and Equipment Manual 	

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		<ul style="list-style-type: none"> - States that, in new ships of 400 tons gross tonnage and above and in new oil tankers of 150 tons gross tonnage and above, no ballast water should normally be carried in any oil fuel tank - Explains that a new chapter 8 - STS operations has been added to MARPOL Annex 1 to prevent marine pollution during some ship-to-ship (STS) oil transfer operations - States that as per the above amendment to Annex I of MARPOL, Tankers of 150 GT and above involved in STS operations are required to have on board by the date of the first periodical survey after 1st January 2011 an STS operations plan approved by the ship flag administration, describing how STS operations are to be conducted 	
Ensure compliance with pollution prevention requirements (Cont)	Knowledge of the precautions to be taken to prevent pollution of the marine environment (Cont)	<p>3. Annex II - Noxious Liquid Substances in Bulk</p> <ul style="list-style-type: none"> - Describes the requirements of Annex II apply to all ships carrying noxious liquid substances in bulk - States that noxious liquid chemicals are divided into four categories, X, Y, Z and OS such that substances in category X pose the greatest threat to the marine environment and those in category Z the least - States that the conditions for the discharge of any effluent containing substances falling in those categories are specified - States that more stringent requirements apply in special areas, which for the purposes of Annex II are the Antarctic area - States that pumping and piping arrangements are to be such that, after unloading, the tanks designated for the carriage of liquids of categories Z do not retain more than certain stipulated quantities of residue - States that the discharge operations of certain cargo residues and certain tank cleaning and ventilation, operations may only be carried out in accordance with approved procedures and arrangements based on standards developed by IMO - States that each ship which is certified for the carriage of noxious liquid substances in bulk should be provided with a Procedures and Arrangements Manual - States that the Manual identifies the arrangements and equipment needed to comply with Annex II and specifies the operational procedures with respect to cargo handling, tank cleaning, slops handling, residue discharging, ballasting and deballasting which must be followed in order to comply with the requirements of Annex II - States that each ship should be provided with a Cargo Record Book which should be completed, on a tank-by-tank basis, whenever any operations with respect to a noxious liquid substance take place - States that a surveyor appointed or authorized by the Government of a Party to the Convention to supervise any operations under this Annex should make an appropriate 	

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Ensure compliance with pollution prevention requirements (Cont)	Knowledge of the precautions to be taken to prevent pollution of the marine environment (Cont)	<p>entry in the Cargo Record Book</p> <ul style="list-style-type: none"> - Describes the surveys required for ships carrying noxious liquid substances in bulk - States that the certificate issued on satisfactory completion of the survey is an International Pollution Prevention Certificate for the Carriage of Noxious Liquid Substances in Bulk <p>4. Annex III-Harmful Substances Carried by Sea in Packaged Forms, or in Freight Containers, Portable Tanks or Road and Rail Tank Wagons</p> <ul style="list-style-type: none"> - States that for the purpose of this annex, empty receptacles, freight containers and portable road and rail tank wagons which have been used previously for the carriage of harmful substances are treated as harmful substances themselves unless precautions have been taken to ensure that they contain no residue that is hazardous to the marine environment - States that packaging, containers and tanks should be adequate to minimize hazard to the marine environment - Describes the requirements for marking and labelling packages, freight containers, tanks and wagons - Describes the notification procedures for loading/unloading harmful substances as per MARPOL Annex III - Describes the documentation relating to the carriage of harmful substances by sea - States that certain harmful substances may be prohibited for carriage or limited as to the quantity which may be carried aboard any one ship - States that jettisoning of harmful substances is prohibited except for the purpose of securing the safety of the ship or saving life at sea 	
Ensure compliance with pollution prevention requirements (Cont)	Knowledge of the precautions to be taken to prevent pollution of the marine environment (Cont)	<p>5. Annex IV – Sewage</p> <ul style="list-style-type: none"> - States that Annex IV contains a set of regulations regarding the discharge of sewage into the sea, ships' equipment and systems for the control of sewage discharge, the provision of facilities at ports and terminals for the reception of sewage, and requirements for survey and certification - Describes the provisions regarding the discharge of sewage into the sea - States that an International Sewage Pollution Prevention Certificate is issued by national shipping administrations to ships under their jurisdiction showing compliance - States that the Annex requires ships to be equipped with either a sewage treatment plant or a sewage comminuting and disinfecting system or a sewage holding tank - States that the discharge of sewage into the sea is prohibited, except when the ship has in operation an approved sewage treatment plant or is discharging comminuted and disinfected sewage using an approved system at a distance of more than three 	

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		nautical miles from the nearest land; or is discharging sewage which is not comminuted or disinfected at a distance of more than 12 nautical miles from the nearest land	
Ensure compliance with pollution prevention requirements (Cont)	Knowledge of the precautions to be taken to prevent pollution of the marine environment (Cont)	<p>6. Annex V – Garbage</p> <ul style="list-style-type: none"> - Defines, for the purposes of Annex V: - Garbage - Nearest land - Special are - States that the provisions of Annex V apply to all ships - States that the disposal into the sea of all plastics is prohibited - States the regulations concerning the disposal of other garbage - States that the special areas for the purposes of Annex V as the Mediterranean sea, Baltic Sea, Black Sea, Red Sea, "Gulfs" area, North Sea, Antarctic area (south of latitude 60 degrees south, Wider Caribbean region including the Gulf of Mexico and the Caribbean Sea 	
Ensure compliance with pollution prevention requirements (Cont)	Knowledge of the precautions to be taken to prevent pollution of the marine environment (Cont)	<p>7. Annex VI - Air Pollution</p> <ul style="list-style-type: none"> - Defines, for the purposes of Annex VI: - Continuous feeding - Emission control area (ECA) - New installations - Nitrogen Oxide (NO_x) technical code - Ozone depleting substances - Sludge oil - Shipboard incineration - Shipboard incinerator - Emission control area - Particular matter (PM) - Volatile organic compounds (VOCs) - Describes the types of inspection required under Annex VI - Describes the provision for the issuance of International Air Pollution Prevention Certificate - Describes the duration of validity of the certificate - Describes the regulation regarding NOX in Regulation 13 of Annex VI - Describes the requirement for SOX emission control area (SECA) - Describes the requirement for fuel oil quality in Regulation 18 of Annex VI <p>States that the special areas for the purposes of Annex VI as the Baltic Sea(SO_x), North</p>	

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		Sea(SOx), North American (SOx, NOx and PM), United States Caribbean Sea ECA (SOx, NOx and PM)	
Ensure compliance with pollution prevention requirements (Cont)	Knowledge of the precautions to be taken to prevent pollution of the marine environment (Cont)	<p>8. Convention and legislations adopted by various countries</p> <ul style="list-style-type: none"> - Basic working knowledge of the conventions and legislations adopted by various countries such as, but not limited to: - Convention of the Prevention of Marine Pollution by Dumping of Wastes and Other Matter (London Dumping Convention) (LDC) - International Convention Relating to Intervention on the High Seas in Cases of Oil Pollution Casualties, 1969 - International Convention on Civil Liability for Oil Pollution Damage, 1969(CLC 1969) - Oil Pollution Preparedness, Response & Cooperation Convention (OPRC) as amended (OPRCHNS Protocol) - OPA - 90 and other US legislation 	4 Hours
Ensure compliance with pollution prevention requirements (Cont)	Anti-pollution procedures and all associated equipment	<p>9. Control of discharge of oil</p> <ul style="list-style-type: none"> - Explains the control of discharge of oil as stated in Regulation 9 of MARPOL 73/78 - Explains Particularly Sensitive Sea Areas (PSSA) - Explains methods for prevention of oil pollution and discharge provisions for oil and oily waste from machinery spaces outside special areas and within special areas - Explains bilge water holding tank - Explains Oily water separator - Explains Oil discharge monitoring and control system and oil filtering equipment as stated in Regulation 16 of MARPOL 73/78 - Explains in brief the prevention of oil pollution as stated in Regulation 13F in the event of collision or stranding and Regulation 13G in the event of collision or stranding - Measures for existing tankers of MARPOL 73/78 - Explains the retention of oil on board as stated in Regulation 15 of MARPOL 73/78 	2 Hours
		<p>10. Oil Record Book (Part I - Machinery Space Operations and Part II - Cargo/Ballast Operations)</p> <ul style="list-style-type: none"> - Describes the requirements for the provision of Oil Record Books, which is, Oil tankers of 150 tons GT and every ship of 400 tons of GT and above other than an oil tanker to carry an Oil Record Book Part I (Machinery Space Operations) - Describes that every oil tanker of 150 tons GT and above shall also be provided with an Oil Record Book Part II (Cargo/Ballast Operations) - Describes the various operation when the Oil Record Book has to be completed - Lists the various entries that needs to be made in the Oil Record Book with respect to above for following operations: 	1 Hour

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Ensure compliance with pollution prevention requirements (Cont)	Anti-pollution procedures and all associated equipment	<ul style="list-style-type: none"> - For machinery space operations (all ships) - For cargo/ballast operations (oil tankers) - Describes the entries required for accidental or other exceptional discharge of oil - Explains that each completed operation shall be signed by the officer or officers in charge of the operations concerned and each completed page shall be signed by the master of ship - States that the Oil Record Book should be kept on board readily available for inspection and should be preserved for a period of three years after the last entry has been made - Explains that the competent authority of the Government of a Party to the Convention may inspect the Oil Record Book on board any ship to which Annex I applies while the ship is in its port or offshore terminals and may make a copy of any entry in that book and may require the master of the ship to certify that the copy is a true copy of such entry 	
Ensure compliance with pollution prevention requirements (Cont)	Anti-pollution procedures and all associated equipment (cont)	<p>11. Shipboard Oil Pollution Emergency Plan (SOPEP) including Shipboard Marine Pollution Emergency Plans (SMPEP) for Oil and/or Noxious Liquid Substances and Vessel Response Plan (VRP)</p> <ol style="list-style-type: none"> 1. States that the Shipboard Oil Pollution Emergency Plan ("SOPEP") is to be seen as an information from the owners to the Master of a particular ship 2. States it is an advice to the Master how to react in case of an oil spill to prevent or at least mitigate negative effects on the environment 3. States that the Plan contains operational aspects for various oil spill scenarios and lists communication information to be used in case of such incidents <p>States that it is compulsory for all ships of more than 400 Gross Tons (Oil tankers of more than 150 GT) to carry a SOPEP onboard</p> <ol style="list-style-type: none"> 4. States that the required contents is described in MARPOL Convention Annex I Reg. 26 5. Explains that "Guidelines for the Development of a Shipboard Oil Pollution Emergency Plan" are published by IMO under MEPC.54(32) 1992 as amended by MEPC.86(44) 2000 6. States that the SOPEP forms an integral part of the IOPP certificate and it's existence is verified in the Supplement to the IOPP Certificate 7. Describes that the Plan consists generally of 4 Sections with the mandatory contents and it's Appendices with additional information as contact addresses and data plus a set of certain drawings for easy reference for the Master 8. Describes that the SOPEP consists of the following Chapters: 	1 Hour

COMPETENCE	KNOWLEDGE, UNDERSTANDING AND PROFICIENCY	PERFORMANCE	APPROX HOURS
Ensure compliance with pollution prevention requirements (Cont)	Anti-pollution procedures and all associated equipment (cont)	<ol style="list-style-type: none"> 1. Ship identification data 2. Table of Contents 3. Record of Changes 4. Section 1: Preamble 5. Section 2: Reporting Requirements 6. Section 3: Steps to control Discharges 7. Section 4: National and Local Coordination 8. Minimum Appendices: <ul style="list-style-type: none"> – List of Coastal State Contacts – List of Port Contacts – List of Ship Interest Contacts 9. Ship's drawings: <ul style="list-style-type: none"> – General Arrangement Plan – Tank Plan – Fuel Oil Piping Diagram 10. Further appendices on owners' decision <ol style="list-style-type: none"> 9. Explains that according to MARPOL following appendices should be added to the SOPEP: 10. Coastal State Contacts (as annually published but quarterly updated in the Internet by IMO) Blank form for listing of Port Contact Addresses to be kept up-to-date by the Master 11. Ship Interest Contact List (communication data incl. 24hours contact phone numbers to owners/managers, data abt. charterer, insurance, P&I Club, etc.) 	
Ensure compliance with pollution prevention requirements (Cont)	Anti-pollution procedures and all associated equipment (cont)	<ol style="list-style-type: none"> 12. Shipboard Marine Pollution Emergency Plan (SMPEP) <ul style="list-style-type: none"> - Explains IMO has adopted a requirement for ships above 150 GRT certified to carry noxious liquid substances in bulk and that these ships shall carry an additional emergency plan called "Shipboard Marine Pollution Emergency Plan for noxious liquid substances" - Explains that this plan, is to be seen as an information from the owners to the Master of a particular ship advising the Master how to react in case of a spill of noxious liquid substances to prevent or at least mitigate negative effects on the environment - Explains that the Plan is compulsory since 1st January 2003 - Describes that the Plan contains operational aspects for various spill scenarios and lists communication information to be used in case of such incidents - Explains that as the contents is mainly similar to the contents of the Shipboard Oil 	

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Ensure compliance with pollution prevention requirements (Cont)	Anti-pollution procedures and all associated equipment (cont)	<p>Pollution Emergency Plan (SOPEP) which is compulsory, IMO recommends to prepare a combined plan called "Shipboard Marine Pollution Emergency Plan" ("SMPEP")</p> <ul style="list-style-type: none"> - Explains that such plan has to fulfill the requirements for the SOPEP and additionally for the Shipboard Marine Pollution Emergency Plan for noxious liquid substances according to the IMO Guideline - States that the required contents is described in MARPOL 73/78 as amended Annex II Reg. 16 - Explains that "Guidelines for the Development of a Shipboard Marine Pollution Emergency Plan for noxious liquid substances" are published by IMO under MEPC.85(44) adopted in March 2000 - Explains that the Certificate of Chemical Fitness or Substances in Bulk respectively can only be issued if the said plan is available onboard - Explains that If a combined plan "Shipboard Marine Pollution Emergency Plan" (SMPEP) is carried, it has to be in accordance with the guidelines MEPC.85(44) and MEPC.54(32) as amended by MEPC.86(44) 	
Ensure compliance with pollution prevention requirements (Cont)	Anti-pollution procedures and all associated equipment (cont)	<p>Vessel Response Plan (VRP)</p> <ul style="list-style-type: none"> - Explains that the VRP- Vessel Response Plan is a plan required for vessels trading to/from/in U.S.A and this U.S. Coast Guard's new regulations to improve pollution-response preparedness for vessels carrying or handling oil upon the navigable waters of the United States came into effect from 22nd February 2011 - Explains that the Oil Pollution Act of 1990 (OPA-90) and the international treaty, MARPOL 73/78, require owners/operators of certain vessels to prepare Vessel Response Plans (VRP) and /or Shipboard oil Pollution Emergency Plans (SOPEP) and in addition, for certain vessels carrying noxious liquid substances a Shipboard Marine Pollution Emergency Plans (SMPEP), effective from 1st January 2003 	
Ensure compliance with pollution prevention requirements (Cont)	Anti-pollution procedures and all associated equipment (cont)	<p>13. Overview of anti-pollution equipment, Sewage plant, incinerator, comminutor, ballast water treatment plant</p> <ul style="list-style-type: none"> - Describes the operating procedures of anti-pollution equipment such as: - Sewage plant - Incinerator - Comminutor - Ballast water treatment plant - 	1 Hour

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Ensure compliance with pollution prevention requirements (Cont)	Anti-pollution procedures and all associated equipment (cont)	<p>14. Volatile Organic Compound (VOC) Management Plan, Garbage Management System, Anti-fouling systems, Ballast Water Management and their discharge criteria</p> <p><i>Volatile Organic Compound (VOC) Management Plan</i></p> <ul style="list-style-type: none"> - Describes that Volatile Organic Compounds (VOC) are organic chemicals that easily vaporize at normal conditions and enter into the atmosphere - Explains that VOC may include a very wide range of individual substances, such as hydrocarbons (e.g. methane, ethane, benzene, toluene, etc.), oxidized hydrocarbons (or fuel oxygenates, such as methyl tert-butyl ether (MTBE)) and by-product organic compounds from chlorination in water treatment (such as chloroform) - Explains that VOC emissions from the fuel/petroleum industry sources occur during extraction of oil at the platform, tanker transportation of oil, loading and discharging at terminals, oil processing at refineries, tanking at filling stations and leakage from pipelines as well as oil spills - Explains that VOC emissions from ships can be due to incomplete combustion processes and include crankcase, exhaust and evaporation emissions - Explains that Tankers emit VOC during cargo loading and crude oil washing operations as well as during sea voyages - Explains that the amount of VOC emissions depends on many factors including the properties of the cargo oil, the degree of mixing and temperature variations during the sea voyage - Explains that to control this emission, there are four criteria that impact the extent and rate of evolution of gaseous non-methane VOC from crude oils and its subsequent release to the atmosphere. These are: <ul style="list-style-type: none"> - The volatility or vapor pressure of the crude oil - The temperature of the liquid and gas phases of the crude oil tank - The pressure setting or control of the vapor phase within the cargo tank - The size or volume of the vapor phase within the cargo tank - Describes that Regulation 15.6 of MARPOL requires a tanker carrying crude oil shall have onboard and implement a VOC Management Plan (Management Plan) approved by the Administration in accordance with IMO Resolution MEPC.185(59) "Guidelines for the Development of a VOC Management Plan" - Explains that this VOC Management Plan is specific to each ship - Explains that the aim of the VOC Management Plan is to identify the arrangements 	3 Hours

COMPETENCE	KNOWLEDGE, UNDERSTANDING AND PROFICIENCY	PERFORMANCE	APPROX HOURS
Ensure compliance with pollution prevention requirements (Cont)	Anti-pollution procedures and all associated equipment (cont)	and equipment required to enable compliance with Regulation 15.6 of the Revised Annex VI and to identify for the ship's officers the operational procedures for VOC emission control	
Ensure compliance with pollution prevention requirements (Cont)	Anti-pollution procedures and all associated equipment (cont)	<p><i>Garbage Management System</i></p> <p>Garbage Management Plan</p> <ul style="list-style-type: none"> - Explains that as per MARPOL 73/78, Annex V, regulation 9 every ship of 400 gross tonnage and above and every ship which is certified to carry 15 persons or more are to be required to carry a garbage management plan which the crew are required to follow - Describes the content of the Garbage Management Plan 	
Ensure compliance with pollution prevention requirements (Cont)	Anti-pollution procedures and all associated equipment (cont)	<p>Garbage Record Book</p> <ul style="list-style-type: none"> - Explains that every ship of 400 gross tonnage and above and every ship which is certified to carry 15 persons or more engaged in voyages to ports or offshore terminals under the jurisdiction of other Parties to the Convention and every fixed and floating platform engaged in exploration and exploitation of the sea-bed are to be provided with a Garbage Record Book - Describes the various operation when the Garbage Record Book has to be completed - Lists the various entries that needs to be made in the Garbage Record Book - Explains the disposal criteria for cargo residues/cargo hold washing water residues 	
Ensure compliance with pollution prevention requirements (Cont)	Anti-pollution procedures and all associated equipment (cont)	<p>Anti-fouling systems</p> <ul style="list-style-type: none"> - States that IMO adopted a new International Convention on the Control of Harmful Anti-fouling Systems on Ships, on 5 October 2001 which will prohibit the use of harmful organotins in antifouling paints used on ships and will establish a mechanism to prevent the potential future use of other harmful substances in anti-fouling system <p>States that the convention entered into force on 17 September 2008</p>	
Ensure compliance with pollution prevention requirements (Cont)	Anti-pollution procedures and all associated equipment (cont)	<p>Ballast Water Management Convention 2004</p> <ul style="list-style-type: none"> - States that The International Convention for the Control and Management of Ships Ballast Water & Sediments (BWM convention) was adopted by consensus at a diplomatic Conference at IMO in London on Friday 13 February 2004 and expected to be ratified - Defines the following: <ul style="list-style-type: none"> - Ballast water - Ballast water management 	

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Ensure compliance with pollution prevention requirements (Cont)	Anti-pollution procedures and all associated equipment (cont)	<ul style="list-style-type: none"> - Sediments - Describes the application of this convention - States that in order to show compliance with the requirements of the Convention each vessel shall have on board a valid Certificate, a Ballast Water Management Plan and a Ballast Water Record Book - Describes the conditions where the application of this convention may be exempted - Describes the management and control requirement based on Section B Regulation B1 to B6 - Describes the Annex - Section A, B, C, D and E briefly - Describes the various methods of ballast exchange - Describes the standards that need to be observed in ballast water exchange - States under Regulation B-4 Ballast Water Exchange, all ships using ballast water exchange should: <ul style="list-style-type: none"> - Whenever possible, conduct ballast water exchange at least 200 nautical miles from the nearest land and in water at least 200 metres in depth, taking into account Guidelines developed by IMO; - In cases where the ship is unable to conduct ballast water exchange as above, this should be as far from the nearest land as possible, and in all cases at least 50 nautical miles from the nearest land and in water at least 200 metres in depth - States as per Annex - Section B Management and Control Requirements for Ships: - Ships are required to have on board and implement a Ballast Water Management Plan approved by the Administration (Regulation B-1). The Ballast Water Management Plan is specific to each ship and includes a detailed description of the actions to be taken to implement the Ballast Water Management requirements and supplemental Ballast Water Management practices. - States that a new paragraph, 4, has been added with effect from July 1, 2010 to SOLAS Chapter V, Regulation 22 - Navigation bridge visibility. Some changes are operational and others introduce new requirements applicable to navigation records - States that as a consequence of this amendment, any increase in blind sectors or reduction in horizontal fields of vision resulting from ballast water exchange operations is to be taken into account by the Master before determining that it is safe to proceed with the exchange - States that as an additional measure, to compensate for possible increased blind sectors 	

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Ensure compliance with pollution prevention requirements (Cont)	Anti-pollution procedures and all associated equipment (cont)	<p>or reduced horizontal fields of vision, the Master must ensure that a proper lookout is maintained at all times during the exchange. Ballast water exchange must be conducted in accordance with the ship's ballast water management plan, taking into account the recommendations adopted by the IMO</p> <ul style="list-style-type: none"> - Explains that in accordance with SOLAS Chapter V, Regulation 28 - Records of navigational activities and daily reporting, the commencement and termination of the operation should be recorded - Explains that the navigational records generated during ballast water exchange may be reviewed during ISM Audits and port state control inspections 	
Ensure compliance with pollution prevention requirements (Cont)	Importance of proactive measures to protect the marine environment	<p><u>Marine environmental awareness</u></p> <ul style="list-style-type: none"> - Recognize the importance of shipping for the world economy - Recognize the environmental impact of shipping - Describe sustainable shipping - Define sustainable development as a balance of three P's – People, Planet, Profit - Explain the meaning of the three P's - Recognize the need for sustainable shipping - Recognize the role of the human element (people in shipping) in pollution prevention - Describe why the oceans are of vital importance for humankind - Recognize that 60% of the world population lives near the sea - Explain the importance of the oceans as a source of food - Explain the importance of the oceans for the global climate - Describe the basic principles of marine ecology - Recognize the importance of phytoplankton (primary production) as the basis of sea life - Give an example of a food chain - Describe the principle of energy flow in the food chain - Describe the principle of energy loss in the food chain (10% rule) - Describe the importance of bacteria and viruses (nutrient cycle) - Recognize that food chains are connected in complex food webs - Differentiate between coastal seas and open oceans - Compare coastal seas and open oceans - Describe the difference in living circumstances between open oceans and coastal 	12 Hours

COMPETENCE	KNOWLEDGE, UNDERSTANDING AND PROFICIENCY	PERFORMANCE	APPROX HOURS
Ensure compliance with pollution prevention requirements (Cont)	Importance of proactive measures to protect the marine environment (cont)	<p>seas, including but not limited to availability of nutrients</p> <ul style="list-style-type: none"> - Describe the difference in food chain length between open oceans and coastal seas - <u>Recognize the diversity and abundance of life in coastal seas</u> - Describe the impact of oil in the marine environment - Recognize the varied and complex composition of oil and oil products - List three processes that determine the fate of oil in the marine environment - Describe two ecological impacts of oil in the marine environment - Describe one economic impact of oil in the marine environment - Recognize the relative contribution of shipping to the discharge of oil to the sea - Describe the relative contribution of accidents and operational discharges of oil from ships - Describe two ways chemicals enter the marine environment from a ship - List three reasons why a chemical might be hazardous - Define the terms acute toxicity and chronic toxicity - Define the term bioaccumulation - Define the term biodegradation - Describe two ecological impacts of chemicals in the marine environment - Describe the impact of sewage in the marine environment - Describe the ecological impact of sewage in the marine environment - Describe the impact of solid waste in the marine environment - Describe how long it takes for plastic to degrade in the marine environment - Recognize the worldwide distribution of marine litter - Recognize the existence of pools of garbage in the Pacific (plastic soup) - Describe the impact of the introduction of invasive species - Define the term invasive species - Describe the transfer of species through ballast water - Describe problems associated with the introduction of alien species - Give an example of the ecological impact of invasive species - Give an example of the economic impact of invasive species - Give an example of the impact of invasive species on human health - Describe the impact of underwater noise on marine mammals - Describe the impact of antifouling paint on marine life 	

COMPETENCE	KNOWLEDGE, UNDERSTANDING AND PROFICIENCY	PERFORMANCE	APPROX HOURS
Ensure compliance with pollution prevention requirements (Cont)	Importance of proactive measures to protect the marine environment (cont)	<ul style="list-style-type: none"> - List three chemical compounds in air emissions from ship engines (SO_x, NO_x, PM) - Recognize how these compounds are formed in ships engines - Describe the environmental impacts of engine emissions - Describe the process of acidification - List two effects of acidification - Explain the connection between SO_x and NO_x emissions and acidification - Describe the main human health hazards connected to air quality - Explain the direct connection between PM and human health - Explain the contribution of SO_x, NO_x and PM emissions to smog - Recognize the adverse impact of smog to human health - Describe the contribution of shipping to the problems with air emission - Identify engine emissions as an important source of air emissions from ships - Describe the link between fuel quality and ship emissions - List two other air pollutants from ships, including Ozone Depletion Substances - List three procedures and/or technical installations designed to minimize engine emissions (SO_x, NO_x, PM) - Describe the role of personal behaviour for pollution prevention - Recognize the importance of officer and crew behaviour for pollution prevention - Give one example where proper behaviour contributes significantly to pollution prevention - Recognize his/her personal responsibility towards the environment - Describe his/her (future) responsibilities with regard to environmental care in shipping - List five actions he/she (can) take to ensure compliance with requirements - Be aware of his/her (future) position as an officer as an example for the rest of the crew - Recognize the influence he/she has on the environmental behaviour of ratings - Recognize the need to motivate the crew to commit themselves to their tasks and to further improve competence, attitudes and motivation of individuals at all levels, as stated in the ISM Code - Identify one action he/she can take to ensure better compliance by ratings 	
Manage the operation of propulsion plant machinery. Plan and	Refrigerators and refrigeration cycle	<ul style="list-style-type: none"> - Assess common refrigerants used on board, using factors such as their properties, economics of use, handling, health hazards, and environmental impact 	4 Hours

COMPETENCE	KNOWLEDGE, UNDERSTANDING AND PROFICIENCY	PERFORMANCE	APPROX HOURS
schedule operations (ML)		<ul style="list-style-type: none"> - Explain the environmental concerns of traditional refrigerants and the methods used to address these concerns - Record keeping of refrigerant consumption 	
Manage fuel, lubrication and ballast operations (ML)	Prevention of pollution of the sea by oil	<ul style="list-style-type: none"> - Describes in principle how bilge and ballast water are discharged - Lists the precautions to be taken when transferring or bunkering fuel oil and lubricating oil. - Describes the requirements for oily water separators. - Explains how the mode and type of pump used affects the contamination of oily water. - Explains how the temperature, relative density and size of oil particles affect the separation process. - Explains the principles of the operation of a two stage and three stage automatic oily water separator. - Explains why and where pressure relief devices are fitted to a separator. - Describes the function of a coalescer. - Explains the principles and purpose of a separator probe. - Describes how the automatic valve is controlled and operated. - Lists the safeguards in an oily water separator system. - Describes the automatic cleaning of an oily water separator. 	4 Hours
		Total No. of Hours	46 Hours

* discrepancy between course specifications and course map total hours is intended for assessment