

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

Course Code	:	Seam 3
Course Descriptive Title	:	Cargo Handling and Stowage (Non-Dangerous Goods)
Course Credits	:	3 units
Lecture Contact Hours per Week	:	3 hours
Laboratory Contact Hours per Week	:	1 hour
Prerequisite	:	Seam 2B
Reference/s	:	1. Table A-II/1 of the 1978 STCW Code as amended Function: Cargo handling and stowage at the operational level 2. Annex A of CMO No. 20, Series of 2015 (Curriculum Mapping for BSMT)

COMPETENCE	KNOWLEDGE, UNDERSTANDING AND PROFICIENCY	TOPICS	APPROX HOURS
Monitor the loading, stowage, securing, care during the voyage and the unloading of cargoes	Knowledge of the effect of cargo, including heavy lifts, on the seaworthiness and stability of the ship	Securing Cargoes <ul style="list-style-type: none"> - Explains the need for solid stow and securing of all cargoes - States that cargo liable to slide during rolling, such as steel rails, should be stowed fore and aft - Describes methods of blocking, lashing, shoring, chocking and tumbing cargo - Describes methods of securing cargo faces resulting from part discharge before making a sea passage - Describes methods of securing heavy loads and heavy lifts 	6

COMPETENCE	KNOWLEDGE, UNDERSTANDING AND PROFICIENCY	TOPICS	APPROX HOURS
		<ul style="list-style-type: none"> - Describes methods of stowing and securing vehicles and trailers - States that unitized, containers, trailers, portable tanks and other cargo units should be secured in accordance with the ship's cargo securing arrangements manual - Describes passenger operations including passenger cargo, passenger comfort and safety 	
		<p>Deck Cargo</p> <ul style="list-style-type: none"> - States that cargoes, other than in containers, commonly carried on deck are: <ul style="list-style-type: none"> - dangerous goods not permitted below decks - large units, difficult or impossible to stow below deck, which can safely be exposed to the elements - cargoes which can be exposed to the weather and which would occupy a very large space below decks - livestock in limited numbers - Explains why efficient securing of cargoes is essential for the safety of the ship as well as the cargo - States that stowage and securing of deck cargo should be adequate for the worst conditions which could be experienced - States that hatches should be securely closed and cleated before loading over them - States that stowage should leave safe access to essential equipment and spaces needed to navigate and operate the ship such as: <ul style="list-style-type: none"> - sounding pipes to tanks and bilges - devices for the remote operation of valves 	4

COMPETENCE	KNOWLEDGE, UNDERSTANDING AND PROFICIENCY	TOPICS	APPROX HOURS
		<ul style="list-style-type: none"> – mooring arrangements – fire-fighting and life-saving equipment – crew accommodation and working spaces – protection for the crew – States that deck cargo should not obstruct the view from the navigating bridge or overside at the bow – States that the weight of deck cargo should not exceed the maximum permissible load on the deck or hatches – Describes how the effects of a concentrated load can be spread over a wider area by the use of dunnage and deck shoring taking into consideration the positioning of girders, transverses and longitudinals under the tank top – Explains the effect of deck cargo on stability with reference to: <ul style="list-style-type: none"> – its vertical moment about the keel – the absorption of water or accretion of ice – the clearing of water from the deck in heavy weather – increased reserve buoyancy of a timber deck cargo – Describes in outline the recommendations on the stowage and lashing of timber deck cargoes as set out in the IMO Code of Safe Practice for Ships Carrying Timber Deck Cargoes – Describes the guard lines or rails to be provided at the sides of a deck stow and at openings in the stow – Describes the provision of means of safe access between the deck and the top of the stow – Describes the method of safe stowage and securing of containers on deck on vessels not specially designed for the carriage of containers – Describes the safe loading/discharging of Ro-Ro cargoes 	

COMPETENCE	KNOWLEDGE, UNDERSTANDING AND PROFICIENCY	TOPICS	APPROX HOURS
		<p data-bbox="1052 337 1247 363">Container Cargo</p> <ul style="list-style-type: none"> <li data-bbox="1104 464 1749 548">– Describes the arrangement of a container ship and explains how the position of a particular container is designated <li data-bbox="1104 557 1749 613">– Explains briefly the sequence of operations during discharging and loading at a terminal <li data-bbox="1104 621 1749 881">– Explains the factors involved in planning a container stow with reference to: <ul style="list-style-type: none"> <li data-bbox="1150 683 1444 709">– stability, trim and list <li data-bbox="1150 717 1304 743">– stresses <li data-bbox="1150 751 1482 777">– stack height and weight <li data-bbox="1150 786 1409 812">– dangerous goods <li data-bbox="1150 820 1528 846">– special stowage restrictions <li data-bbox="1150 854 1352 880">– out of gauge <li data-bbox="1104 889 1749 915">– Describes methods of securing containers on deck <li data-bbox="1104 924 1749 950">– Describes the types and sizes of container in use 	2
		<p data-bbox="1052 987 1184 1013">Bulk Cargo</p> <ul style="list-style-type: none"> <li data-bbox="1104 1081 1724 1166">– Describes in outline the contents of the IMO International Maritime Solid Bulk Cargo (IMBSC) Code <li data-bbox="1104 1174 1696 1367">– Defines: <ul style="list-style-type: none"> <li data-bbox="1150 1209 1388 1235">– angle of repose <li data-bbox="1150 1243 1696 1300">– cargoes which may liquefy - flow moisture point <li data-bbox="1150 1308 1318 1334">– flow state <li data-bbox="1150 1343 1524 1369">– transportable moisture limit 	3

COMPETENCE	KNOWLEDGE, UNDERSTANDING AND PROFICIENCY	TOPICS	APPROX HOURS
		<ul style="list-style-type: none"> - Describes in detail the preparation of cargo holds prior to loading bulk cargoes - Explains that separation between certain bulk cargoes and other than bulk cargoes or package of dangerous goods is required - Explains 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 - Describes the hazards associated with coal cargoes - Describes the importance of monitoring the temperature of the holds associated with carriage of coal cargoes - Describes the precautions to take during loading and discharging coal - Explains how coal should be ventilated 	
		<p data-bbox="1056 824 1255 850">Bulk Grain Cargo</p> <ul style="list-style-type: none"> - Defines the following terms as used in the International Grain Code: <ul style="list-style-type: none"> - grain - filled compartment - partly filled compartment - Describes the cleaning and preparation of holds and decks for the carriage of grain - States that a thorough check for insect or rodent infestation should be made - Describes the dangers associated with using insecticide in cargo holds - Explains the importance of trimming and states how it should be made - Distinguishes between the trimming of filled and partly filled compartments - Describes the use of fitting of shifting boards 	2

COMPETENCE	KNOWLEDGE, UNDERSTANDING AND PROFICIENCY	TOPICS	APPROX HOURS
		<ul style="list-style-type: none"> - Describes how saucers or bundles of bulk grain are arranged in the square of a hatch to reduce heeling moments resulting from a shift of grain - Describes how the surface of a partly filled compartment is secured against movement - Describes how to separate two different bulk grain cargoes loaded into the same compartment 	
	<p>Knowledge of safe handling, stowage and securing of cargoes, including dangerous, hazardous and harmful cargoes, and their effect on the safety of life and of the ship</p>	<p>Cargo Care</p> <p><i>Inspection and Preparation of Holds</i></p> <ul style="list-style-type: none"> - Outlines the reasons for a general inspection of holds - Lists items to be inspected - Explains the importance of cleaning holds before loading - Describes how to clean holds after discharge of a general cargo - States describes the reasons for using dunnage - Describes the types and sizes of material used for dunnage - States describes the methods of dunnaging a hold for various cargoes and how to dispose of old dunnage - Explains states that dirty dunnage may taint or contaminate the next cargo - Describes the fitting or spar ceiling and explains its purpose - States that bilges or drain wells should be clean, dry and sweet-smelling disinfectants used - Explains how bilge suction should be checked for efficient working scuppers and sounding pipes - Describes how limbers and drain well covers should be treated to prevent suction being 	9

COMPETENCE	KNOWLEDGE, UNDERSTANDING AND PROFICIENCY	TOPICS	APPROX HOURS
		<p>blocked by small debris, but ensuring free drainage to the suctions</p> <ul style="list-style-type: none"> - States that the ballast lines to deep tanks should be blanked when preparing to load dry cargo - States that the use of a deodorizing wash for ozonator may be necessary to remove strong odours from a previous cargo <p><i>Segregation and Separation of Cargoes</i></p> <ul style="list-style-type: none"> - Explains the need for the segregation of different cargoes with reference to: <ul style="list-style-type: none"> - dangerous goods - dry cargo - wet cargo - clean cargo - dirty cargo - delicate cargo - valuable cargo, e.g. bank notes, personal effects - Describes how the cargoes in the above objectives can be segregated - Explains that separation between parcels of cargo for different consignees or different ports of discharge is required - Describes methods of separating adjacent parcels of cargo - Describes the use of port marking to separate parcels for discharge at different ports <p><i>Ventilation and Control</i></p> <ul style="list-style-type: none"> - Lists the factors involved in the control of sweat by ventilation - Distinguishes between ship's sweat and cargo sweat and explains the conditions in which each is experienced 	

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		<ul style="list-style-type: none"> - Describes the system of natural ventilation and how it should be controlled to minimise the formation of sweat - Describes forced ventilation and humidity control for cargo holds and states the properties measured and recorded at the control panel - Explains how to operate the ventilation system described in the above objective - States that ventilation is also required for the removal of heat, gases and odours - Gives examples of cargoes requiring special ventilation <p><i>Refrigerated Cargo</i></p> <ul style="list-style-type: none"> - Explains how holds and lockers are prepared for loading - Explains the need for the pre-cooling of spaces and dunnage to be used - Describes the dunnaging requirements for refrigerated cargo - Gives examples of commodities carried chilled - Gives examples of frozen cargoes - Lists the inspections of the cargo which should be made before and during the loading - Describes the use of brine traps in compartment drains - before this stage - Explains the purpose of compartment temperature recordings 	
		<p>Cargo handling equipment and safety</p> <p><i>Cargo Handling Equipment</i></p> <ul style="list-style-type: none"> - Describes the care and maintenance of: 	7

COMPETENCE	KNOWLEDGE, UNDERSTANDING AND PROFICIENCY	TOPICS	APPROX HOURS
		<ul style="list-style-type: none"> - standing rigging - topping lifts, cargo runners, guys and preventers - cargo blocks and topping lift blocks - derrick heel fittings - Describes the rigging of derricks for loading and discharging cargo: <ul style="list-style-type: none"> - using married falls (union purchase) - by single swinging derrick - Explains how to set up guys and preventers for working with married falls - States that gear should be set up in accordance with the ship's rigging plan and explains limitations and effect of angles between runners - Describes how to change the rig from single runners to gun tackles - Describes how to top and lower derricks safely - Describes means of securing derricks for sea - Describes the use of slings, snotters, canvas slings, trays, pallets, nets, chain slings, cant hooks, bale hooks and vehicle slings - States describes the precautions to take when lifting bales with hooks in the bale bands and damage caused by hooks generally - Describes the handling of common unitized and pre-slung loads - Compares the advantages and disadvantages of ship's cranes and derricks for handling cargo - types of derricks - Hallen, Stullen, Thompson, Velle etc. - States describes the precautions to be taken when fork-lift trucks or similar devices are used in the 'tween-decks or holds <p><i>Cargo Handling Safety</i></p> <ul style="list-style-type: none"> - States that all cargo gear should be visually inspected before the start of cargo operations each 	

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		<p>day and awareness of test certifications and registration</p> <ul style="list-style-type: none"> - Describes the importance of having a Safe Working Load (SWL) for the cargo gear - States explains why the load on cargo gear should never exceed its safe working load - States that all ropes and wires should come with the certificate of their properties - States that ropes, wires, blocks and loose gear should be subject to frequent inspections while in use for cargo operations - Explains 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 - Explains 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 should be securely fenced to a minimum height of 1 metre - States that it is the ship's responsibility to cover hatches when notice of completion of work for the day is given by the stevedore in charge - States that no person should use a ladder in the square of a hatch while cargo is being hoisted or lowered in that square - States that no person should stand or pass under a suspended load - Describes the provision of adequate lighting for working spaces, portable lights and precaution with dangerous cargoes, e.g. jute 	

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		<ul style="list-style-type: none"> - States that portable lights should be removed from cargo spaces as soon as they are no longer required - Explains states that unattended portable lights are potential fire hazards - Describes the importance of maintaining close communication with the shore during the loading and unloading stage - Describes the information that should be agreed between ship and shore before any loading or unloading operation 	
		<p>Precautions before entering enclosed or contaminated spaces</p> <ul style="list-style-type: none"> - Lists potentially dangerous spaces, including: <ul style="list-style-type: none"> - cargo spaces - cargo, fuel and ballast tanks - pump-rooms - cofferdams - duct keels, peak tanks, double bottom tanks - States that enclosed spaces should be entered only with authorization and after appropriate safety checks have been carried out - States that an enclosed space may be lacking in oxygen or contain flammable or toxic gases - States that the master or responsible officer must ensure that a space is safe for entry by: <ul style="list-style-type: none"> - ensuring that the space has been thoroughly ventilated - testing at several levels for oxygen content and the presence of harmful vapours 	2

COMPETENCE	KNOWLEDGE, UNDERSTANDING AND PROFICIENCY	TOPICS	APPROX HOURS
		<ul style="list-style-type: none"> – requiring breathing apparatus to be worn when there is any doubt about the adequacy of ventilation or testing – States that the oxygen content should be 21 % by volume before entry is permitted – Defines TLV, TWA, and STEL, and gives examples of their value – States that the concentration of harmful vapour should be below its threshold limit value (TLV) – Explains states that a space where the atmosphere is known to be unsafe should be entered only in an emergency, after safety checks have been carried out, and wearing breathing apparatus – Describes a permit-to-enter system using safety checklists to be followed by the responsible officer and the person(s) entering the space – States that risk assessment must be carried out before the entry into enclosed spaces – Lists the items appearing on the checklists – Describes the protective clothing and equipment which should be used by or be available to those entering the space – States that mechanical ventilation should be maintained throughout the time persons are in an enclosed space – Explains why periodical tests of the atmosphere should be made by persons working in an enclosed space – States that all safety checks should be repeated before re-entering a space after a break – States that a permit-to-work system should only be for the specific duration of the work for that particular day and not valid for the following day – States that after work is completed, the area must be closed and secured 	

COMPETENCE	KNOWLEDGE, UNDERSTANDING AND PROFICIENCY	TOPICS	APPROX HOURS
Inspect and report defects and damage to cargo spaces, hatch covers and ballast tanks	<p>Knowledge and ability to explain where to look for damage and defects most commonly encountered due to:</p> <ul style="list-style-type: none"> .1 loading and unloading operations .2 corrosion .3 severe weather conditions <p>Ability to state which parts of the ship shall be inspected each time in order to cover all parts within a given period of time</p> <p>Identify those elements of the ship structure which are critical to the safety of the ship</p> <p>State the causes of corrosion in cargo spaces and ballast tanks and how corrosion can be identified and prevented</p> <p>Knowledge of procedures on how the inspections shall be carried out</p> <p>Ability to explain how to ensure reliable detection of defects and damages</p> <p>Understanding of the purpose of the "enhanced survey programme"</p>	<p>Cargo Space Inspections</p> <ul style="list-style-type: none"> – Describes the possible causes of damage to the cargo space during cargo operation – Describes the general layout of a cargo space for a bulk carrier – Describes the general layout of the cargo space for an oil tanker – Describes the general layout of the cargo space for a container vessel – Describes the general layout of a general cargo ship – Describes the defects that could arise due to the nature of cargo carried – Describes the corrosion effect that could arise due to structural stress, uneven distribution of cargo, chemical reactions on the ship structure – Lists the methods in use to prevent the occurrence of corrosion in cargo spaces – Describes the damage to cargo space due to severe weather condition – Identifies structural or parts to be inspected each time in order to cover all parts within a given period of time – Describes the safety procedures before entry into the cargo tank for inspection 	5
		<p>Hatch covers inspection</p> <ul style="list-style-type: none"> – Describes the working principles of a hatch cover 	5

COMPETENCE	KNOWLEDGE, UNDERSTANDING AND PROFICIENCY	TOPICS	APPROX HOURS
		<ul style="list-style-type: none"> - Explains the construction of a hatch cover - Identifies the difference between watertight and weathertight - Identifies the critical components of the hatch cover that contribute to weathertightness - Identifies the critical components of the hatch cover that contribute to watertightness - Identifies the structural components of a hatch cover which are most likely to experience corrosion - Describes the testing methods for a hatch cover 	
		<p>Ballast tanks inspection</p> <ul style="list-style-type: none"> - Describes the purpose of ballast tanks - Reproduces the construction sketch of a ballast tank - Identifies the parts in the ballast tanks which are most likely to experience corrosion - Lists the period of interval for the inspection of ballast tanks - Describes the corrosion prevention methods for ballast tanks 	2
		<p>Damage report</p> <ul style="list-style-type: none"> - Lists the items that need to be taken into account where preparing a damage report - Lists the evidence that needs to be collected in assisting the preparation of a damage report 	1
		<p>Enhanced survey programme</p>	1

COMPETENCE	KNOWLEDGE, UNDERSTANDING AND PROFICIENCY	TOPICS	APPROX HOURS
		<ul style="list-style-type: none"> <li data-bbox="1102 261 1734 349">– Describes the guidelines on the Enhanced Programme of Inspections during surveys of Bulk Carrier 	
TOTAL			49