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

Course Code	**:**	Met-O 2
Course Descriptive Title	**:**	Meteorology and Oceanography 2
Course Credits	**:**	4 units
Lecture Contact Hours per Week	**:**	4 hours
Laboratory Contact Hours per Week	**:**	0 hour
Prerequisite	**:**	Met-O 1
Reference/s	**:**	1. Table A-II/2 of the 1978 STCW Code as amended Function: Navigation at the Management Level 2. IMO Model Course 7.01 3. Annex A of CMO No. 20, Series of 2015 (Curriculum Mapping for BSMT)

COMPETENCE	KNOWLEDGE, UNDERSTANDING AND PROFICIENCY	TOPICS/PERFORMANCE	APPROX HOURS
Forecast weather and oceanographic conditions	*Ability to understand and interpret a synoptic chart and to forecast area weather, taking into account local weather conditions and information received by weather fax*	**Synoptic and Prognostic Charts and Forecasts From Any Source** - interprets the isobaric patterns of a synoptic weather chart with interpolation and extrapolation as necessary - determines the geostrophic and approximate surface wind	6

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		speeds from the chart by use of the geostrophic wind scale - determines the weather associated with specific places within the plots - determines the likely movement of pressure systems, - evaluates the use of prognostic charts - evaluates the information given in shipping forecasts - evaluates the information received from internet and email	
		The Range of Information Available - lists the information available to the mariner in fax transmissions - discusses the source of information relating to radio stations, and their transmissions - evaluates the information given in surface synoptic and prognostic fax charts - interprets the information given in wave charts - evaluates the information given in ice charts - evaluates the use of 500 hPa charts in forecasting the progress of	5

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		depressions - evaluates the value of personal observations of weather signs, in evaluating weather trends - lists the information available to the mariner via internet and email - evaluates the information received from internet and email	
		Weather Forecasting R1, R2 Ch.V, R100 - forecasts anticipated local weather from synopsis and prognosis information received, the movement of meteorological systems, knowledge of local influences, observation of local conditions and movement of own ship	15
	Knowledge of the characteristics of various weather systems, including tropical revolving storms and avoidance of storm centres and the dangerous quadrants	**Tropical Revolving Storms (TRS)** R1, R2 - states the definitions adopted by the WMO with respect to Tropical Storms	8

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		- states local nomenclature of TRS - states regions and seasons of greatest frequency of TRS - states the conditions associated with the formation of tropical revolving storms - states the factors which affect the future movement of a TRS - describes with the aid of diagrams typical and possible tracks of TRS - explains the factors associated with the decay of TRS - draws a plan of a TRS showing isobars, wind circulation, path, track, vortex or eye, trough line, dangerous semicircle, dangerous quadrant and navigable semicircle (for north and south hemispheres) - explains the reasons for the naming of the dangerous semicircle	
		- draws a cross section through a TRS showing areas of cloud and precipitation - describes the characteristics of a	

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		TRS, ie size, wind, pressure, eye, cloud and precipitation sequence - describes the signs which give warning of the approach for the TRS - explains the methods of determining the approximate bearing of an approaching TRS - explains the method of determining in which sector of a TRS the ship is situated - states the correct avoidance procedure when in the vicinity of a TRS - given the position and direction of travel of a TRS and ship's voyage information, describes appropriate measures to avoid the danger sector of a TRS - describes the messages required to be sent in accordance with the requirements of SOLAS, when a TRS is encountered, or suspected to be in the vicinity	
		- describes the	

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		message required to be sent in accordance with the requirement of SOLAS when a wind of or above storm force 10 is encountered which has not previously been reported	
		The Main Types of Floating Ice, Their Origins and Movements - explains the formation of icebergs from floating glacier tongues and from ice shelves, and the characteristics of each - discusses the formation of sea ice - defines ice tongue, ice shelf - defines pack ice and fast ice - discusses the normal seasons and probable tracks of North Atlantic bergs from origin to decay - defines the outer limits of the area in which icebergs may be encountered in the North Atlantic - discusses the normal and extreme limits of iceberg travel in the southern oceans during summer and winter - explains the reasons for the decay of icebergs - describes the areas affected by sea ice in regions frequented by shipping - discusses the seasonal development and recession of sea ice on the coastlines of the northern oceans, and in the latitude of the normal trade routes	2

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		The Guiding Principles Relating to the Safety of Navigation in Ice - states the signs which may indicate the proximity of ice on clear days and nights - defines the ranges at which observers may expect to detect ice visually in varying conditions of visibility, see T61 - discusses the limitations of radar as a means of detecting ice - states the precautions to be taken when navigating near ice, and when ice is suspected in the vicinity	2
		Conditions Leading to Ice Accretion on Ship's Superstructures, Dangers and the Remedies Available - describes the factors which may give rise to ice accretion - describes the use of data in the Mariner's Handbook, for estimating the rate of ice accretion - evaluates the methods of avoiding or reducing ice accretion - explains the reports to be made under International Conventions when ice is encountered - lists the information to be given in radio messages reporting dangerous	2

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		ice - states the iceberg nomenclature in use by the International Ice Patrol - lists the information to be given in radio messages reporting conditions leading to severe ice accretion on ship's superstructures	
	Knowledge of ocean current systems	**Surface Water Circulation of the Ocean and Principal Adjoining Seas** - defines qualitatively the effect of geostrophic force on surface currents - discusses the generation of drift currents by prevailing winds - discusses the generation of gradient currents from differences in water temperature and salinity - discusses the generation of gradient currents resulting from the indirect effect of wind causing a piling up of water on	3

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		windward coasts, as in the case of the Equatorial Counter Currents - analyses the nature of currents formed by a combination of the above as experienced by western shores of large land Masses - relates the general pattern of surface water circulation to the atmospheric pressure distribution	
		- constructs a chart showing global surface water circulation applicable to the above - describes the seasonal changes in the above in areas under the influence of the Asian monsoons - identifies the principal individual currents by name - analyses the causes of individual currents where explicitly stated in Meteorology for Mariners - explains the	

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		classification of individual currents as warm or cold where appropriate - describes the form in which surface current data is presented in current atlases and on routeing charts - evaluates qualitatively the use of this data in passage planning - explains the derivation of the current rose - explains the derivation of the predominant current - shows the meaning of the term constancy when applied to predominant currents - explains the derivation of the vector mean current - compares qualitatively the values of the information given by the current rose, the predominant current and the vector mean current as aids to passage planning	
		Voyage planning principles with respect to weather conditions and wave height - selects and uses data from Ocean	2

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		Passages of the World - describes climatological routeing - defines significant wave height - discusses the factors affecting wave height and direction - describes the methods employed in forecasting wave heights - describes optimum (least time) routeing - evaluates the forms of routeing in the above objectives - describes the methods of constructing a least time track - appraises the relative merits of ship and shore based routeing, and their limitations - describes the construction of ships' performance curves - demonstrates the use on monthly Routeing Charts - explains the construction and use of a Baillie wind rose - demonstrates familiarity with the forms of climatological, meteorological and current data presented in the Sailing Directions (Pilot Books) and in	

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		the Mariner' Handbook	
		The formation of sea waves and swell waves - selects and uses data from Ocean Passages of the World - explains the role of wind in wave formation - explains the importance of wind force in wave formation - explains the importance of duration of wind causing waves - explains the importance of fetch in the growth of waves - uses Dorrenstein's nomogram for forecasting significant wave heights - states the relationship between sea waves and swell waves - explains the decay of swell waves as they travel from the area of origin	2
	Ability to calculate tidal conditions	**Ability to calculate tidal conditions** - explains the non-astronomical component of sea level - explains other irregularities of the tide - states that the predicted tide level is not an accurate value - demonstrates the use of tide tables - determines height and	6

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		time for high and low water in secondary ports - determines the predicted height of water at a given time in a tabulated port - determines the predicted time for a given tide level - demonstrates the use of tidal stream charts - defines the zero level of the charts - evaluates qualitatively the effect of high or low atmospheric pressure on tide levels - evaluates qualitatively the effect of persistent winds on tide levels and tidal times - evaluates qualitatively the effect of abrupt changes of weather conditions on tidal levels - describes seismic waves, their origin and areas of prevalence - demonstrates use of computer programmes to obtain tidal information - explains briefly the use of harmonic constant method of tidal	

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		prediction - explains the reliability of tidal predictions (awareness of the factors influencing the accuracy and reliability of predictions (e.g. local weather conditions, flooding, local area knowledge, etc)	
	Use all appropriate nautical publications on tides and currents	**Nautical publications and information which can be obtained via internet and e-mail on tides and currents** - uses tidal height calculations in passage planning, with regard to limiting draughts and times of available depth of water - uses tidal stream information in passage planning, with regard to effect on course made good, and effect on speed, timing of events - uses current information in passage planning, with regard to effect on course made good, and effect	3

COMPETENCE	KNOWLEDGE, UNDERSTANDING AND PROFICIENCY	TOPICS/PERFORMANCE	APPROX HOURS
		on speed, timing of events - uses information which can be obtained via internet and email on tides and currents in passage/voyage planning	
		TOTAL	54