

Registration code – NAUT MET1

METEOROLOGY, LEVEL 1 (MET 1)

Duration – 120 hours

Course description

This is an entry level course designed to provide mariners with a basic knowledge of: the characteristics of the various weather systems, reporting procedures and recording systems; use of meteorological instruments found on board ships; and the interpretation of weather information.

Required for the following certificates of competencies:

- Fishing Master, 3th Class
- Fishing Master, 2nd Class
- Watchkeeping Mate, Near Coastal
- Watchkeeping Mate
- Chief Mate
- Master 150T, Domestic
- Master 500T, Domestic
- Master 500T, Near Coastal

Subject	Knowledge required
Competence:	Plan and conduct a passage and determine position
Ability to use and interpret information obtained from shipborne meteorological instruments	Shipborne Meteorological instruments Mercurial barometer; Aneroid barometer; Thermometer; Function of a hygrometer; Basic principles of wind sensors; The basic principles of wind sensors, take and log readings of wind speed.
Knowledge of the characteristics of the various weather systems, reporting procedures and recording system	The Atmosphere, its composition and physical properties The composition of the earth's atmosphere, mentioning dry air and its constituents, water vapour and aerosols; Ability to draw and label a typical vertical temperature profile through the lower 100 km of the earth's atmosphere; Definition of troposphere, tropopause, stratosphere, stratopause, mesosphere, mesopause and thermosphere; Ability to describe the main features of the troposphere; The nature of solar radiation, (scattering, reflection and absorption); The effect on insolation of a variation in latitude; The effect on insolation of a variation in the sun's declination; The effect on insolation of a variation in the length of daylight; Definition of water vapour; The properties of water vapour in the atmosphere; Definition of evaporation, condensation, latent heat of vaporization; Definition of saturated air; The processes of mixing, cooling and the evaporation of water vapour, by which a sample of air may be brought to saturation; Definition of dewpoint, absolute humidity, relative humidity, vapour pressure. Atmospheric pressure Knowledge of pressure equals force per unit area; Knowledge of the atmosphere exerts a pressure on any surface within it; Knowledge of the atmosphere pressure on a unit area of a surface is equal to the weight of the air column extending from that surface to the outer fringes of the atmosphere; Ability to explain that atmospheric pressure decreases with height above sea level; Knowledge of atmospheric pressure acts in all directions; What is the basic unit of pressure; What is the average pressure at sea level; Ability to explain that the surface pressure rises if air is added to the column above the surface, and vice versa; Define isobar.

Subject	Knowledge required
Competence:	Plan and conduct a passage and determine position
<p>Knowledge of the characteristics of the various weather systems, reporting procedures and recording system</p>	<p>Wind Definition of wind; The Beaufort scale of wind force; The pressure gradient force; The coriolis force; The surface wind circulation around high and low pressure centres; Buys-Ballot's law; The method of estimating the strength of the wind and direction from the appearance of the sea surface, using the Beaufort wind scale; The difference between apparent and true wind; Ability to determine the true wind velocity by using a vector diagram, given the apparent wind and the ship's course and speed; The use of a geostrophic wind scale.</p> <p>Cloud and precipitation How does clouds form; What does a cloud can consist of; The need for and the definition of condensation nuclei; Ability to name and describe the ten basic cloud types; The probable base heights of the ten principal cloud types; Definition of precipitation, rain, drizzle, hail, snow and sleet; Theory of formation of thunderstorms and lightnings; Associated clouds, conditions within the clouds; Times, seasons and localities of occurrence.</p> <p>Visibility Definition of fog, mist, haze; Ability to apply the concept of processes leading to supersaturation to a classification of fogs as mixing, cooling or evaporation fogs; The formation of radiation fog; The effect of pollution on the formation of radiation fog; The formation of advection fog; The conditions leading to the formation of sea smoke, and typical areas where sea smoke may be encountered; Methods of estimating the visibility at sea, by day and by night, and the difficulties involved.</p> <p>The wind and pressure systems over the oceans Ability to sketch the circulation cells which would exist on a rotating earth, not inclined to its orbit of rotation around the sun, and with a homogeneous surface; Ability to draw the mean surface pressure and wind distribution over the earth's surface in January and July; The characteristics and location of the doldrums, intertropical convergence zone, trade winds, sub-tropical oceanic highs, westerlies and polar easterlies; Ability to describe a monsoon regime; Areas which experience a true monsoon regime; The causes of monsoon regimes; Ability to apply the concept of horizontal temperature differences to the explanation of the formation of land and sea breezes; The formation of anabatic and katabatic winds; The regions of occurrence of anabatic and katabatic winds; Examples of local winds.</p> <p>Structure of depressions Definition of air mass; The formation of air mass; Definition of Source region; The characteristics required of a source region; The source-region characteristics of arctic, polar, tropical and equatorial air-mass types; Definition of warm front and cold front; Recognise the symbols for warm and cold fronts; With the aid of a diagram, ability to describe the weather experienced during the passage of an idealized warm front; With the aid of a diagram, ability to describe the weather experienced during the passage of an idealized cold front; Definition of depression; Ability to identify a depression on a surface synoptic or prognostic chart;</p> <p>The stages in the life cycle of a polar front depression; Family of depressions; Ability to draw a diagram of a polar front depression, for both northern and southern hemispheres, showing isobars, warm and cold fronts, with circulation and warm sector; Ability to draw a cross-section through a polar front depression, on the poleward and equatorial side of the centre, showing fronts, cloud and precipitation areas; The usual movement of a polar front depression; The weather changes experienced when a frontal depression passes with its centre on the poleward side of an observer in the northern hemisphere and in the southern hemisphere; The process leading to the occlusion of a polar front depression; Ability to identify a trough of low pressure on a surface synoptic or prognostic chart; The weather associated with the passage of a trough.</p>

Subject	Knowledge required
Competence:	Plan and conduct a passage and determine position
Knowledge of the characteristics of the various weather systems, reporting procedures and recording system	<p>Anticyclones and other pressure system Definition of anticyclone; Ability to draw a synoptic pattern of an anticyclone, for both northern and southern hemispheres, showing isobars and wind circulation; Ability to identify an anticyclone on a surface synoptic or prognostic chart; The weather associated with anticyclones; Definition of a ridge of high pressure; Ability to draw a synoptic pattern for a ridge, showing isobars and wind directions; Describe a typical weather sequence during the passage of a ridge between depressions across the observer's position; Definition of col; Ability to draw a synoptic pattern for a col, showing isobars and wind directions; The weather associated with a col; Ability to identify ridges and cols on a surface synoptic or prognostic chart.</p> <p>Weather services for shipping The organization, functions and objectives of the World Meteorological Organization; The sources of weather information available to shipping; The information flow between merchant ships and Meteorological Offices; The services provided for shipping by Meteorological offices; The appropriate weather bulletin and the contents of each of its sections; The types of information received by facsimile machine; The services provided for storm warnings.</p> <p>Recording and reporting weather observations The need for meteorological codes; Uses the Ship's Code and Decode book to code a ship's full report; Uses the Ship's Code and Decode book to decode a ship's full report; Uses the Ship's Code and Decode Book to decode a reduced report from a shore station; Uses Beaufort letter abbreviations for present and past weather and total cloud amount; Interprets a ship or shore station plot.</p>
Ability to apply the meteorological information available	<p>Weather Forecasting Applies previous concepts to the interpretation of symbols and isobaric patterns on weather charts and facsimile charts; Applies previous concepts to the interpretation of synoptic and prognostic charts to ascertain wind directions, areas of strong winds, cloud and precipitation areas, fog areas, ice and areas of fine weather; Explain how weather observations at a ship can be used to improve the forecast derived from synoptic and prognostic charts.</p>