

## Higher National Unit Specification

### General information for centres

**Unit title:** Marine Meteorology: An Introduction

**Unit code:** FOLH 34

**Unit purpose:** This Unit introduces the candidate to marine meteorological observing methods, codes and the weather services available to shipping. It develops knowledge of meteorological processes and the identification of and weather associated with, the main synoptic systems as well as knowledge of the circulation of the atmosphere and oceans. It is primarily aimed at candidates who intend to seek sea-going employment as a Merchant Navy Deck Officer. However, it could also be studied by someone with an interest in the subject area.

On completion of the Unit the candidate should be able to:

- 1 Describe meteorological observing methods, use of meteorological instruments, use of world meteorological organization (WMO) codes and weather services available to shipping.
- 2 Explain meteorological processes.
- 3 Identify and describe the weather associated with the main features of a synoptic chart.
- 4 Describe the general circulation of the atmosphere, the main climatic zones over the oceans and the ocean currents of the world.

**Credit points and level:** 1 HN Credit at SCQF level 7: (8 SCQF credit points at SCQF level 7\*)

*\*SCQF credit points are used to allocate credit to qualifications in the Scottish Credit and Qualifications Framework (SCQF). Each qualification in the Framework is allocated a number of SCQF credit points at an SCQF level. There are 12 SCQF levels, ranging from Access 1 to Doctorates.*

**Recommended prior knowledge and skills:** Access to this Unit is at the discretion of the centre. However candidates would benefit most from this Unit if they have successfully completed the *Marine Induction Course* associated with the HNC/D Nautical Science.

**Core Skills:** There are opportunities to develop the following Core Skills in this Unit, although there is no automatic certification of Core Skills or Core Skills components.

Numeracy: Using Number	at SCQF level 5
Numeracy: Using Graphical Information	at SCQF level 6
Communication: Reading	at SCQF level 5
Communication: Writing	at SCQF level 5
Using Information Technology	at SCQF level 5
Problem Solving: Reviewing and Evaluating	at SCQF level 5

## **General information for centres (cont)**

**Context for delivery:** If this Unit is delivered as part of a Group Award, it is recommended that it should be taught and assessed within the subject area of the Group Award to which it contributes.

**Assessment:** Outcome 1 may be assessed by using a single unseen assessment consisting of questions that are administered under supervised closed-book conditions. Outcomes 2, 3 and 4 can be combined for assessment purposes and assessed by a closed-book assessment under supervised conditions.

## Higher National Unit specification: statement of standards

**Unit title:** Marine Meteorology: An Introduction

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The sections of the Unit stating the Outcomes, knowledge and/or skills, and Evidence Requirements are mandatory.

Where evidence for Outcomes is assessed on a sample basis, the whole of the content listed in the knowledge and/or skills section must be taught and available for assessment. Candidates should not know in advance the items on which they will be assessed and different items should be sampled on each assessment occasion.

### Outcome 1

Describe meteorological observing methods, use of meteorological instruments, use of world meteorological organisation (WMO) codes and weather services available to shipping

#### Knowledge and/or skills

- ◆ Meteorological instruments
- ◆ Beaufort Scale
- ◆ The organisation of the WMO
- ◆ Weather services available to shipping
- ◆ Non-instrument meteorological observations

#### Evidence Requirements

All knowledge and skills are assessed, however there is sampling **within** each of the knowledge and skills.

Candidates will need evidence to demonstrate their knowledge and/or skills by showing that they can correctly:

- 1 Describe the principles and use of a sample of three of the following instruments:
  - ◆ Aneroid and precision aneroid barometers
  - ◆ Barograph
  - ◆ Mason's hygrometer, marine screen and whirling psychrometer
  - ◆ Sea temperature apparatus
- 2 Use the Beaufort Scale. Candidates should be required to evaluate the wind Beaufort scale from two scenarios.

## Higher National Unit specification: statement of standards (cont)

### Unit title: Marine Meteorology: An Introduction

3 Describe the principles of non-instrumental meteorological observations of:

- ◆ Waves
- ◆ Wind (true and apparent)
- ◆ Horizontal visibility
- ◆ Types of cloud

Candidates will be required to identify clouds from a sample of two photographs of different clouds.

4 Explain the organisation of WMO and the observing network and discuss the process of coding ships' meteorological observations.

5 Describe the weather services available to shipping.

Candidates should be able to describe the types of weather bulletins and surface charts available to the mariner and the methods of transmission and availability.

A different sample should be used on each assessment occasion.

### Assessment guidelines

Outcome 1 will be assessed on a sample basis by means of an assessment administered under supervised closed-book conditions.

### Outcome 2

Explain meteorological processes

#### Knowledge and/or skills

- ◆ Meteorological characteristics of the troposphere
- ◆ Characteristics and causes of geostrophic and surface winds
- ◆ Processes of formation of cloud and precipitation
- ◆ Causes of reduced horizontal visibility

#### Evidence Requirements

Candidates will need evidence to demonstrate their knowledge and/or skills by showing that they can correctly:

- 1 Explain the structure of and describe the methods of heating and cooling of the troposphere. This must include the variation of surface temperatures, Environmental Lapse Rate and its variation including temperature inversions.
- 2 Define pressure, pressure units and isobars.
- 3 Explain geostrophic and surface winds and the forces producing both winds. This must include pressure gradient, pressure gradient force, Coriolis force, cyclostrophic force and friction.
- 4 Describe the use of the Geostrophic wind scale and Buys Ballot's Law.

## Higher National Unit specification: statement of standards (cont)

### Unit title: Marine Meteorology: An Introduction

- 5 Explain the formation of one of the following; land breeze, sea breezes or katabatic winds.
- 6 Explain changes of state of water in the atmosphere, latent heat, adiabatic temperature changes and atmospheric stability.
- 7 Explain methods of cloud formation as related to atmospheric stability, cloud decay.  
This should be sampled from either stable or unstable cloud formation.
- 8 Describe one type of precipitation and its processes of formation.
- 9 Explain the formation from a sample of one of the following:  
Advection fog, radiation fog, mist haze.
- 10 Explain the formation of dew and frost.

A different sample should be used on each assessment occasion for elements 5, 7, 8 and 9.

### Assessment guidelines

Outcome 2 will be sample assessed by closed-book assessment under supervised conditions on meteorological processes. It is recommended that Outcome 2 be combined with Outcomes 3 and 4 for assessment purposes.

### Outcome 3

Identify and describe the weather associated with the main features of a synoptic chart

#### Knowledge and/or skills

- ◆ Surface charts
- ◆ Main synoptic patterns
- ◆ Air masses
- ◆ Weather associated with the main synoptic patterns

#### Evidence Requirements

All knowledge and skills are assessed, however there is sampling **within** each of the knowledge and skills.

Candidates will need evidence to demonstrate their knowledge and/or skills by showing that they can:

- 1 Identify and describe the weather associated with the main synoptic patterns and features on a surface chart.

On each assessment occasion the following must be assessed:

- (i) Frontal depressions including families and secondary depressions.
- (ii) Non-frontal depressions and non-frontal troughs.
- (iii) Anticyclones.
- (iv) Ridges of high pressure

## Higher National Unit specification: statement of standards (cont)

### Unit title: Marine Meteorology: An Introduction

- 2 Identify and describe the weather associated with air masses on a surface chart from a sample of one of the following:

Polar, Tropical, Arctic and Antarctic air masses.

- 3 Identify and describe the causes of local winds on a surface chart from a sample of one of the following:

- ◆ NE Monsoon and SW Monsoon

A different sample should be used on each assessment occasion.

### Assessment guidelines

Outcome 3 will be sample assessed by open-book assessment under supervised conditions on the identification and description of the weather associated with the main synoptic patterns. It is recommended that Outcome 3 be combined with Outcomes 2 and 4 for assessment purposes. Suitable surface charts will be provided to the candidate.

### Outcome 4

Describe the general circulation of the atmosphere, the main climatic zones over the oceans and the ocean currents of the world

### Knowledge and/or skills

- ◆ General circulation of the atmosphere
- ◆ Main climatic zones over the oceans
- ◆ Ocean currents of the world

### Evidence Requirements

All knowledge and skills are assessed, however there is sampling **within** each of the knowledge and skills.

Candidates will need evidence to demonstrate their knowledge and/or skills by showing that they can:

- 1 Describe the characteristics and location of the main climatic zones over the oceans.

Candidates will have to indicate the main climatic zones on a world map and should describe the characteristics of **one** zone which has been indicated. A different zone should be used on each assessment occasion

- 2 Identify and describe the pressure distribution and prevailing winds in either January or July.
- 3 Identify and describe the geographical areas and seasons where Tropical Revolving Storms can occur.

## **Higher National Unit specification: statement of standards (cont)**

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On each assessment occasion candidates will be required to indicate the areas affected on a map of the world. Candidates must also state the season for each area and the local names used for a TRS.

- 4 Identify the principal surface ocean currents of either the Pacific or Atlantic Ocean.

Candidates should state whether the currents are warm or cold and also indicate the direction of water flow.

### **Assessment guidelines**

Outcome 4 will be sample assessed by closed-book assessment under supervised conditions on the general circulation of the atmosphere, the main climatic zones over the oceans and the ocean currents of the world. It is recommended that Outcome 4 be combined with Outcomes 2 and 3 for assessment purposes.

## Administrative Information

**Unit code:** F0LH 34

**Unit title:** Marine Meteorology: An Introduction

**Superclass category:** RF

**Original date of publication:** August 2006

**Version:** 01

### History of Changes:

Version	Description of change	Date

**Source:** SQA

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## **Higher National Unit specification: support notes**

### **Unit title: Marine Meteorology: An Introduction**

This part of the Unit specification is offered as guidance. The support notes are not mandatory.

While the exact time allocated to this Unit is at the discretion of the centre, the notional design length is 40 hours.

### **Guidance on the content and context for this Unit**

The content of this Unit forms part of the underpinning knowledge for the Level 3 SVQ Marine Vessel Operations and reflects the content of International Maritime Organisation's Standards of Training Certification and Watchkeeping (STCW).

### **Guidance on the delivery and assessment of this Unit**

The knowledge and skills acquired in this Unit will be practised extensively at sea so that the experience gained can be utilised in the HN Unit FOLP 35 *Applied Marine Meteorology* and FOLG 35 *Marine Passage Planning* which feature in the later stages of the HND Nautical Science.

The following notes give additional information on the knowledge and skills for each of the four Outcomes

#### **Outcome 1**

This Outcome enables candidates to be able to use and understand the principles of several meteorological instruments, namely the barometer, barograph, Mason's hygrometer, marine screen, whirling psychrometer and sea temperature apparatus. In addition, candidates will gain the knowledge to be able to use the Beaufort scale and make non-instrument observations of waves, wind, horizontal visibility and cloud types. The coding of meteorological observations mentioned above will also be investigated. The weather services available to shipping will be explored as will the organisation of the WMO.

#### **Outcome 2**

The structure of the troposphere will be investigated and the methods of heating and cooling within the troposphere will be discussed. This will include the variation of surface temperatures, environmental lapse rates and temperature inversions.

Candidates will be able to define pressure, pressure units and isobars. The theory associated with geostrophic winds and gradient winds will be explored including the effect of Coriolis force, Centrifugal force and friction. Candidates will also be able to apply Buys Ballots Law and be able to use the Geostrophic wind scale.

The formation of land and sea breezes will be explored as well as the formation of Katabatic winds.

The changes of state of water within the environment and the Hydrological cycle will be investigated along with latent heat, adiabatic temperature changes and atmospheric stability.

## **Higher National Unit specification: support notes (cont)**

### **Unit title:** Marine Meteorology: An Introduction

The methods of cloud formation as related to atmospheric stability will be discussed in addition to the formation of cloud and precipitation and causes of reduced visibility. The processes of the different types of formation of precipitation will be investigated as will the formation of dew and frost.

The formation of radiation and advection fog and mist will be explored in addition to the development of haze within the atmosphere.

#### **Outcome 3**

Candidates will be able to identify from a surface chart the major synoptic patterns including frontal depression, families and secondary depressions, non-frontal depressions, non-frontal troughs, anticyclones and ridges of high pressure. They will also be able to describe the weather associated with such synoptic patterns.

They will also be able to identify and describe the weather associated with Polar, Tropical, Arctic and Antarctic air masses.

The processes which cause the NE Monsoon and SW Monsoon to develop will be explored and candidates will also gain a knowledge of the local weather conditions associated with the Monsoon.

#### **Outcome 4**

This Outcome explores the general circulation of the atmosphere and examines the main climatic zones over the ocean. This includes the global pressure distribution and the prevailing winds during both January and July. The areas and season in which Tropical Revolving Storms occur will also be investigated and candidates will also be able to discuss the local names for these storms.

The name, location and direction of travel of the major oceanic currents will be examined and candidates will also be able to classify, where appropriate warm or cold currents.

#### ***Opportunities for developing Core Skills***

The Unit will provide candidates with the opportunity to develop the Core Skills of Numeracy, Using Number at SCQF level 5. Candidates will develop the use of numbers through calculations involving several variables in order to calculate surface wind speeds and direction as well as relative humidity. Also the candidate will learn to use vectors to calculate true wind speed and direction.

Using Graphical Information at SCQF level 6 is developed as the candidate uses graphical information to determine geostrophic wind speeds, dew point temperature and humidity. The candidate also learns to analyse the graphical information depicted on synoptic charts in order to construct weather forecasts. This also allows the candidate to develop their problem solving, reviewing and evaluation (SCQF level 5) skills. These skills are also further developed as the candidate builds a knowledge of the large scale meteorological and oceanographic processes.

Communication (Reading and Writing at SCQF level 5) skills are developed and Using Information Technology (SCQF level 5) skills are acquired as candidates use the internet to investigate on-line weather services and weather education sites. On-line tutorials are also utilised.

## **Higher National Unit specification: support notes (cont)**

**Unit title:** Marine Meteorology: An Introduction

Although the above skills are developed, there is no automatic certification of Core Skills or Core Skills components.

### **Open learning**

This Unit is not suited to delivery by distance learning because it requires candidates to be observed and questioned by a qualified practitioner to meet Statutory/professional body requirements.

### **Candidates with disabilities and/or additional support needs**

The additional support needs of individual candidates should be taken into account when planning learning experiences, selecting assessment instruments or considering alternative Outcomes for Units. For information on these, please refer to the SQA document *Guidance on Alternative Assessment Arrangements for Candidates with Disabilities and/or Additional Support Needs*, which is available on SQA's website: [www.sqa.org.uk](http://www.sqa.org.uk).

## **General information for candidates**

### **Unit title:** Marine Meteorology: An Introduction

This Unit is about marine meteorological observing methods, codes and weather services to shipping. It develops knowledge of meteorological processes and the identification of, and weather associated with, the main synoptic systems as well as knowledge of the circulation of the atmosphere and oceans.

On completion of this Unit you should be able to:

- ◆ use meteorological observing methods, WMO codes and weather services available to shipping
- ◆ explain meteorological processes
- ◆ identify and describe the weather associated with the main features of a synoptic chart
- ◆ describe the general circulation of the atmosphere, the main climatic zones over the oceans and the ocean currents of the world

Whenever possible you should relate the above Outcomes to your own experience. Your ability to take meteorological observations and use codes may be assessed by a closed-book assessment under supervised conditions. Your knowledge of meteorological processes, weather systems and ocean currents may be assessed by a closed-book assessment under supervised conditions.