

Higher National Unit Specification

General information for centres

Unit title: Applied Marine Meteorology

Unit code: F0LP 35

Unit purpose: This Unit is about interpreting and evaluating meteorological, climatological and oceanographic data, with the objective of forecasting the weather and sea conditions that may be encountered during a voyage. 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 Identify and analyse the major features of surface synoptic charts.
- 2 Analyse the features of the major global climate zones.
- 3 Analyse surface oceanographic processes and data.
- 4 Evaluate the effect of meteorological and climatological processes on passage planning.

Credit points and level: 1.5 HN Credits at SCQF level 8: (12 SCQF credit points at SCQF level 8*)

**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 it would be beneficial if candidates had achieved either a UK MCA 'Officer of the Watch' Certificate or equivalent, or the HNC Nautical Science, or the HN Unit FOLH 34 *Marine Meteorology: An Introduction*.

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 Graphical Information) at SCQF level 6

Communication (Reading and Writing) at SCQF level 5

Using Information Technology at SCQF level 5

Problem Solving (Reviewing and Evaluating) at SCQF level 6

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 an open-book practical forecasting exercise under supervised conditions with access to course notes. Outcomes 2, 3 and 4 can be assessed using a single unseen assessment that is administered under supervised closed-book conditions.

Higher National Unit specification: statement of standards

Unit title: Applied Marine Meteorology

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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

Identify and analyse the major features of surface synoptic charts

Knowledge and/or skills

- ◆ Major features of surface charts.
- ◆ Development of surface pressure systems
- ◆ Movement of surface pressure systems
- ◆ Decay of surface pressure systems
- ◆ Weather conditions associated with types of surface pressure systems

Evidence Requirements

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

- 1 Identify and analyse the major features of surface charts establishing the factors that affect the development, decay and movement of surface and upper air pressure systems including:
 - ◆ Frontal and non-frontal depressions
 - ◆ Troughs
 - ◆ Anticyclones
 - ◆ Ridges
 - ◆ Cols
 - ◆ Frontogenesis and Frontolysis
- 2 Analyse the weather conditions associated with surface pressure systems including:
 - ◆ Frontal and non-frontal depressions
 - ◆ Troughs
 - ◆ Anticyclones
 - ◆ Ridges
 - ◆ Cols

In cases 1 and 2 above, candidates will be provided with a series of synoptic charts and asked to construct weather forecasts based on the information shown on the charts.

Higher National Unit specification: statement of standards (cont)

Unit title: Applied Marine Meteorology

Assessment guidelines

Outcome 1 may be assessed by an open-book practical forecasting exercise under supervised conditions with access to course notes.

Outcome 2

Analyse the features of the major global climate zones

Knowledge and/or skills

- ◆ Major global climate zones
- ◆ Weather conditions associated with the major climate zones

Evidence Requirements

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

- 1 Analyse the features of the major climate zones establishing the factors that affect the development of the zones including:
 - ◆ Inter-Tropical Convergence Zone (ITCZ)
 - ◆ Trade Winds
 - ◆ Polar Front
 - ◆ Monsoons
 - ◆ Jet-Streams
 - ◆ Rossby Waves
 - ◆ Tropical Revolving Storms (TRS)
 - ◆ El-Nino
- 2 Analyse the weather conditions associated with major climate zones for a sample of three from the following:
 - ◆ ITCZ
 - ◆ Trade Winds
 - ◆ Polar Front
 - ◆ Monsoons
 - ◆ TRS
 - ◆ El-Nino

Assessment guidelines

Outcome 2 may be assessed by closed-book written questions under supervised conditions on the analysis of meteorological and climatological data. It is recommended that Outcome 2 be combined with Outcomes 3 and 4 for assessment purposes.

Higher National Unit specification: statement of standards (cont)

Unit title: Applied Marine Meteorology

Outcome 3

Analyse surface oceanographic processes and data

Knowledge and/or skills

- ◆ Oceanographic processes that drive surface ocean currents
- ◆ Oceanographic data
- ◆ Oceanographic conditions that may be encountered during a voyage

Evidence Requirements

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

- 1 Analyse and explain the processes that affect the development of the major ocean surface currents.
- 2 Identify and analyse the characteristics of the major ocean currents.
- 3 Analyse the origins of wind, swell and extreme storm waves.
- 4 Identify and describe each of the following:
 - (i) the main types of floating ice
 - (ii) the origins of floating ice
 - (iii) the distribution of floating ice
 - (iv) the expected movement of floating ice
 - (v) nomenclature of floating ice

Assessment guidelines

Outcome 3 may be assessed by closed-book written questions under supervised conditions on the interpretation and evaluation of meteorological and climatological data relating to ocean currents, wind, swell and storm waves and dangerous ice . It is recommended that Outcome 3 be combined with Outcomes 2 and 4 for assessment purposes.

Higher National Unit specification: statement of standards (cont)

Unit title: Applied Marine Meteorology

Outcome 4

Evaluate the effect of meteorological and climatological processes on passage planning

Knowledge and/or skills

- ◆ Ocean weather routing of ships
- ◆ Presentation of meteorological and climatological data
- ◆ Weather and sea conditions that may be encountered during a voyage

Evidence Requirements

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

- 1 Evaluate the different types of weather routing for a sample of one from the following:
 - ◆ Least Time
 - ◆ Least Damage
 - ◆ Least Time Least Damage
 - ◆ Fuel Saving
 - ◆ Towing
- 2 Analyse the process of construction of a least time weather route.
- 3 Describe methods used to present ocean current data for a sample of one from the following:
 - ◆ Vector Mean
 - ◆ Predominant Current
 - ◆ Current Rose
- 4 Describe the methods used to present wave data.
- 5 Evaluate the use of climate routing charts.
- 6 Code and decode ice data as presented on Admiralty routing charts.
(Candidates will be required to decode an Ice Egg)
- 7 Analyse the conditions that may cause ice accumulation on ships.
- 8 Evaluate the factors controlling the accumulation.
- 9 Estimate rates of accumulation using data provided.

Higher National Unit specification: statement of standards (cont)

Unit title: Applied Marine Meteorology

Assessment guidelines

Outcome 4 will be sample assessed by closed-book questions under supervised conditions on the interpretation, evaluation and presentation of meteorological and climatological data. It is recommended that Outcome 4 be combined with Outcomes 2 and 3 for assessment purposes.

Administrative Information

Unit code: F0LP 35
Unit title: Applied Marine Meteorology
Superclass category: RF
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History of Changes:

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Higher National Unit specification: support notes

Unit title: Applied Marine Meteorology

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 60 hours.

Guidance on the content and context for this Unit

The content of this Unit forms part of the underpinning knowledge for a UK MCA *Chief Mate Certificate of Competency* and accordingly reflects the content of International Maritime Organisation's *Standards of Training Certification and Watchkeeping (STCW)*.

The Unit is primarily intended for candidates who are new entrants to the Merchant Navy via one of the Merchant Navy Training Board (MNTB) approved deck cadet training schemes or for seafarers who are enrolled on a Chief Mates/Master course. Ideally candidates would have already accrued some shipboard experience prior to attempting this Unit, although this is not a prerequisite.

The knowledge and skills contained within the Unit cover all the requirements as laid down by Standards for Training and Certification of Watchkeepers (STCW) 95 at the Management level aboard ship.

Completion of the Unit will also ensure that the candidate complies with all the requirements laid down by the UK Maritime and Coastguard Agency (MCA) for the issue of a Chief Mate's Unlimited Certificate of Competence as a Deck Officer. The required knowledge and skills for MCA Certification can be found in a document detailing the requirements for the issue of an Education and Training Certificate (C&D), which is available from the MNTB.

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

Outcome 1

This Outcome enables the candidate to identify the major features on a synoptic chart including depressions, troughs, anticyclones, ridges, cols, frontolysis and frontogenesis. They will then be able to construct weather forecasts based on a set of synoptic charts covering a period of up to four days.

Outcome 2

The factors that affect the development of the major global climate zones will be discussed. This will include the pressure distribution at the ITCZ, the formation of the Trade Winds and the Polar Front. The factors which affect the formation of the Jetstreams will also be explored along with the relationship between the Jetstreams and the Monsoons.

The weather associated with the ITCZ, Trade Winds, polar Front and the Monsoons will be investigated.

The formation and flow of Rossby Waves in the upper atmosphere will be investigated in conjunction with the effect that these waves have on the surface weather patterns.

Higher National Unit specification: support notes (cont)

Unit title: Applied Marine Meteorology

The factors that govern the formation of TRSs will also be discussed as will the implications that these weather systems have on ships at sea.

The El-Nino effect will also be explored. This will include the effect that this phenomenon has on both changes in global weather patterns and on surface current flow.

Outcome 3

This Outcome will enable the candidate to understand the principles that govern the formation of surface ocean currents. The global flow pattern and characteristics of the surface currents will be discussed.

The formation of wind, swell and extreme storm waves will also be explored as will the effect that such waves have on ships.

The formation of the main types of floating ice will be investigated along with the distribution and movement of the ice.

Outcome 4

This Outcome will enable the candidate to evaluate the effect of meteorological and climatological processes on passage planning. The various forms of weather routeing will be discussed and the formation of a “least time” weather route will be investigated.

The various ways in which current and wave data is presented will also be explored as will the method used to present ice data on routeing charts. Candidates will use this information to investigate the effect and implication of waves and current on ship’s speed. They will also be able to decode Ice Eggs.

The use and advantages versus disadvantages of Climate Routeing Charts will also be discussed.

The conditions and factors that may cause ice accretion to take place on ships will be investigated along with the factors that control the accumulation rates.

Higher National Unit specification: support notes (cont)

Unit title: Applied Marine Meteorology

Guidance on the delivery and assessment of this Unit

Candidates will benefit most if this Unit is delivered in conjunction with the following HN Units: F0LG 35 *Marine Passage Planning* and F0LW 35 *Management OF Bridge Operations*. They should also be able to draw on the knowledge gained from the qualifications or Units recommended as prior knowledge as well as experience gained from service at sea.

Opportunities for developing Core Skills

The Unit will provide candidates with the opportunity to develop the Core Skill of Numeracy (Using Graphical Information) at SCQF level 6.

The use of Graphical Information at SCQF level 6 is developed as the candidate uses graphical information to determine geostrophic wind speeds, ice accumulation rates and the effect of waves on ship's speed. Candidates also have to construct a graphical representation of a weather route.

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 6) skills. These skills are also further developed as the candidate builds knowledge of the large scale meteorological and oceanographic processes.

Communication (Reading and Writing) at SCQF level 5 skills are developed throughout the Unit 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.

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.

General information for candidates

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On completion of the Unit you should be able to:

- 1 Identify and analyse the major features of surface synoptic charts.
- 2 Interpret and evaluate the features of the major global climate zones.
- 3 Analyse and evaluate surface oceanographic processes and data.
- 4 Evaluate the effect of meteorological and climatological processes on passage planning.

You may be assessed using two assessment events. One assessment may be an open-book assessment under supervised conditions. This assessment event will cover Outcome 1. Outcomes 2–4 may be assessed by a closed-book assessment under supervised conditions.