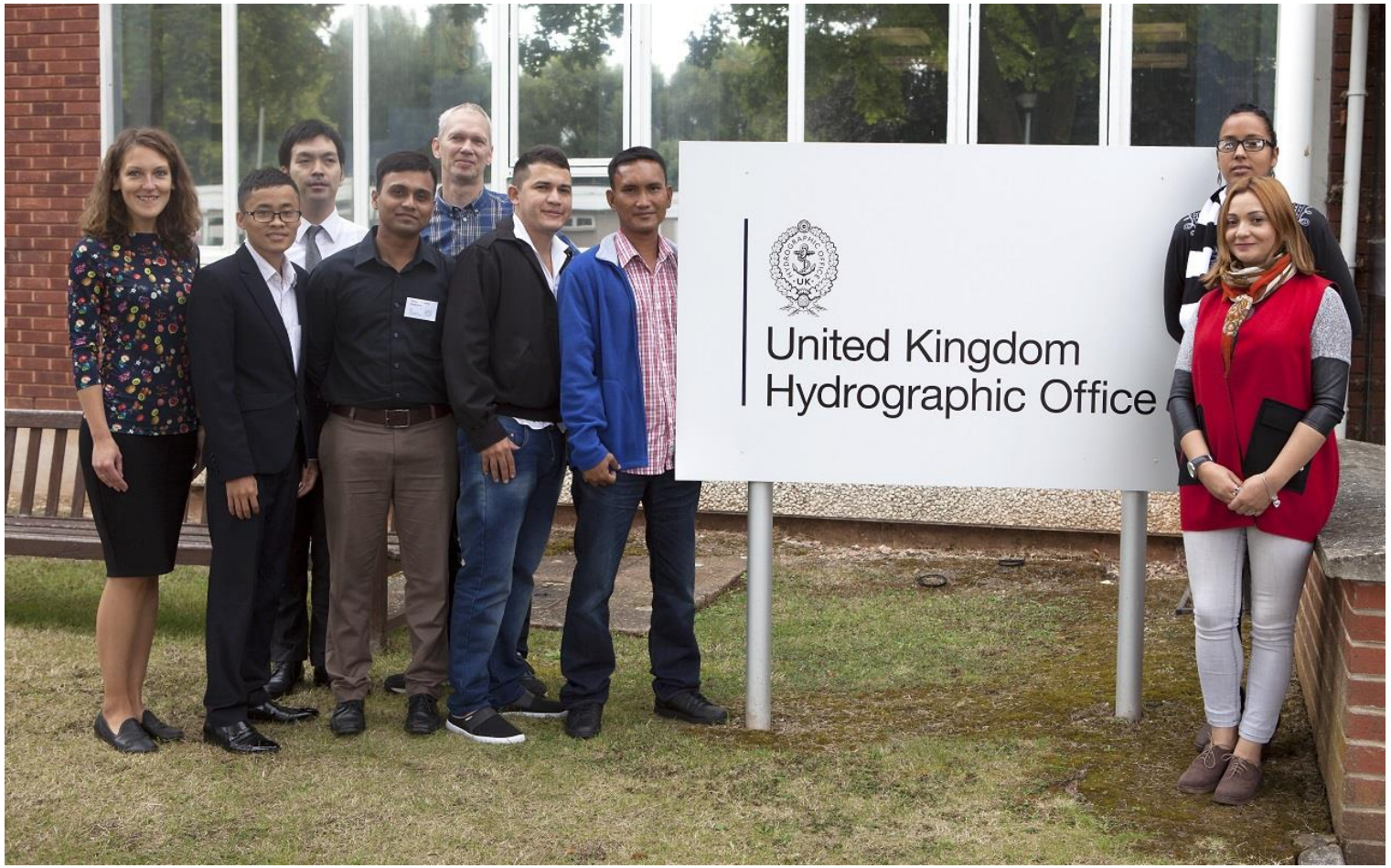
United Kingdom
Hydrographic Office

# MARINE CARTOGRAPHY AND DATA PROCESSING

**IHO Category B Programme**

United Kingdom
Hydrographic Office

THE NIPPON FOUNDATION




Class of 2016

United Kingdom
Hydrographic Office

# THE TRAINING TEAM






**150 years of Cartographic experience**

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# SUBJECT MATTER EXPERTS

Law of the Sea

Marine Law

Intellectual Property

Geodesy

Tidal Theory

Nautical Publications

IC- ENC RENC

ENC Encryption

IHO S-101

Satellite Imagery

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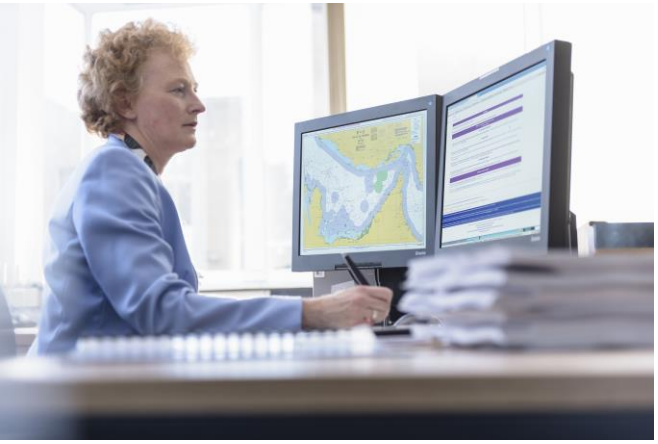
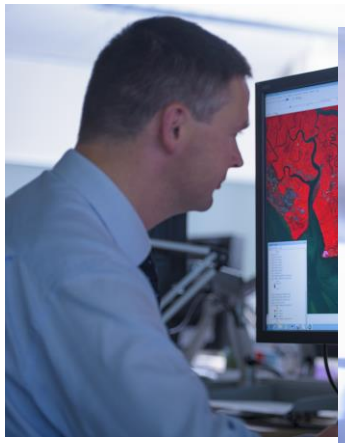
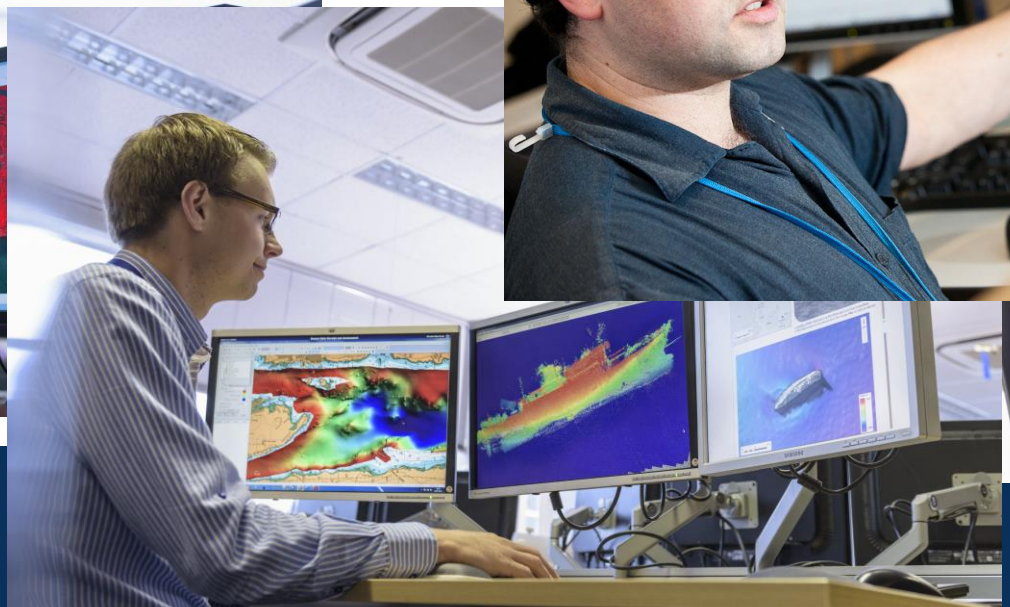
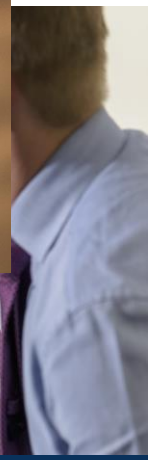








# ACADEMIC BASELINE

## STUDENT SELECTION CRITERIA

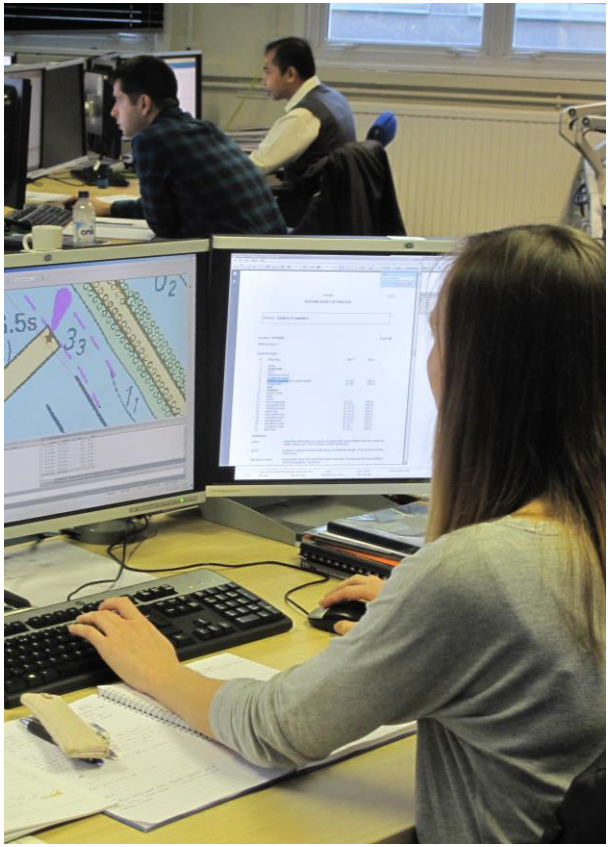
Applicants should be involved in the production and maintenance of navigational charts

Organizations nominating should ensure that applicants will have the opportunity to apply the learning undertaken

Good standard of English, written and spoken, with reasonable technical English.

A high standard in mathematics and geography.

A background in cartography or hydrographic surveying or other relevant experience.



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# ACADEMIC OBJECTIVE

INTERNATIONAL FEDERATION OF SURVEYORS

INTERNATIONAL HYDROGRAPHIC ORGANIZATION

INTERNATIONAL CARTOGRAPHIC ASSOCIATION

**STANDARDS OF COMPETENCE**
**for**
**Nautical Cartographers**

**Publication S-8**
**Third Edition**
**Version 3.1.0 - December 2014**

Guidance and Syllabus for Educational and Training Programmes

**Category B Programme**

A programme which provides a practical comprehension of nautical cartography for individuals with the skill to carry out routine nautical cartographic tasks.

**FIG/IHO/ICA INTERNATIONAL ADVISORY BOARD SYLLABUS – 3rd EDITION**

| Item and Title | Level A B | Both Category B and A | Only for Category A |
|---|---|---|---|
| **Essential 3: Nautical Cartographic Data** | | | |
| **E3.1 Metadata** | PF | Explain the purpose and importance of metadata. | Organize and utilize metadata sets for various spatial entities. |
| **E3.2 Coastline and Topographic Data** | DF | Identify and explain different sources of information used to delineate the coastline and other topographic features. | Evaluate sources and specifications of data. |
| **E3.3 Bathymetric Data** | DF | Identify and explain different sources of information providing bathymetric data. Explain the concept of CATZOC (CATegory of ZOnes of Confidence) | Analyse the characteristics of bathymetric data. Evaluate sources and quality of data, from leadline to multibeam sonar and airborne LIDAR bathymetry. |
| **E3.4 Horizontal and Vertical Datum** | PF | Identify the various types of datums used by various datasets. Explain the differences between these datums. | Apply and calculate datum transformation. Evaluate block shifts, "rubber sheeting" and other techniques of relating datasets, plus their advantages, limitations and disadvantages. |
| **E3.5 Digital Elevation Models** | PF | Describe the utilization of digital elevation models for the production and portrayal of | Identify the methods for the creation of digital elevation models using point and |

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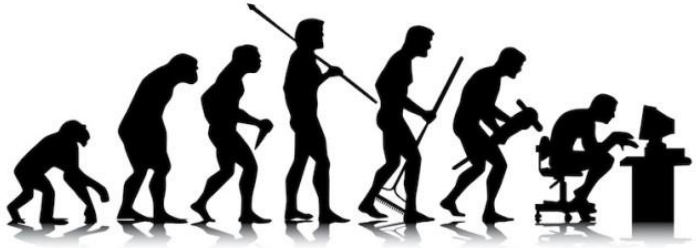
# EVOLUTION OF THE COURSE

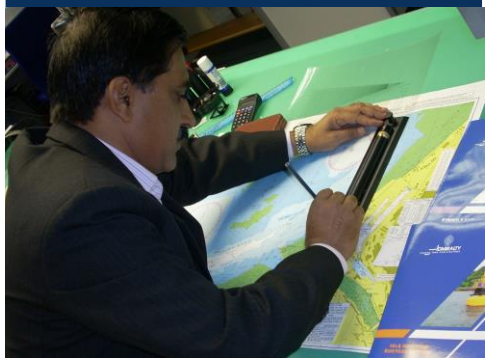
**2009 – 2013**



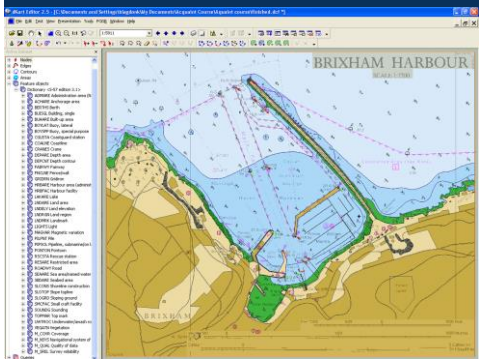
**2014 - 2016**

## Marine Cartography

## Data Assessment



## ENC Production



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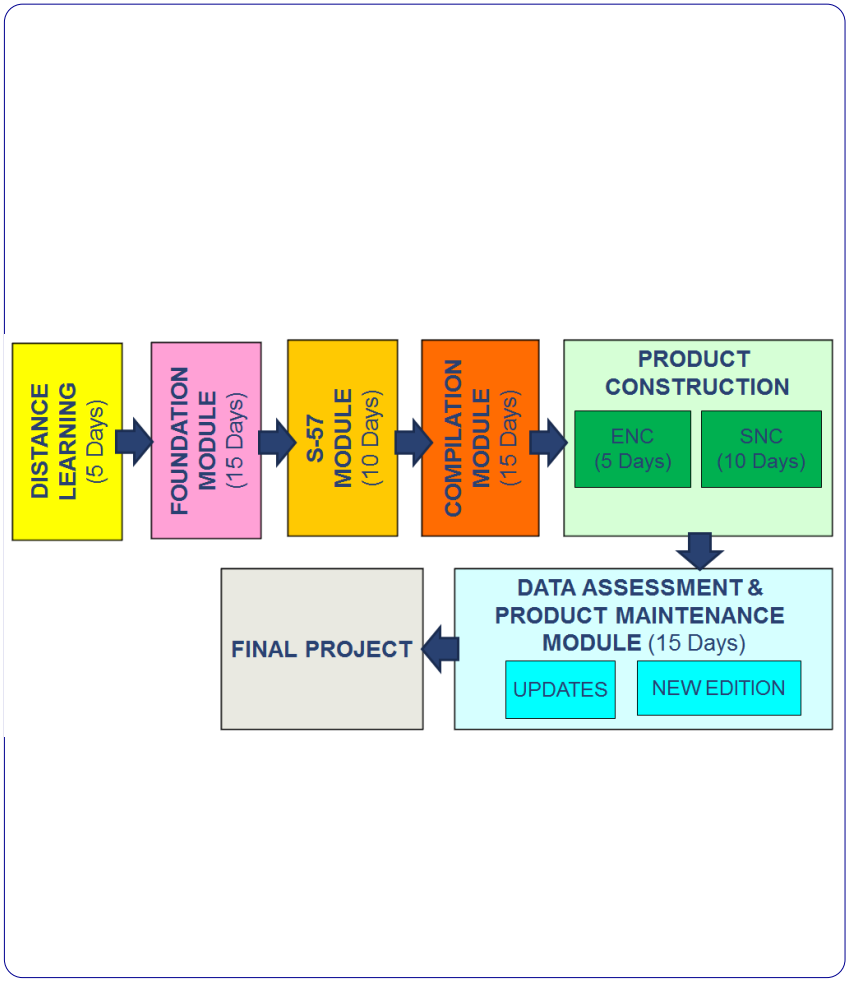
# COURSE PROGRAMME

- DISTANCE LEARNING
- FOUNDATION
- IHO S-57 TRANSFER STANDARD
- DATA BASE COMPILATION
- PRODUCT CONSTRUCTION
- DATA ASSESSMENT AND PRODUCT MAINTENANCE
- WORK EXPERIENCE



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# MODULE OBJECTIVES

- DISTANCE LEARNING
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**Foundation:** To understand the content, structure and standards of the standard paper nautical chart (SNC), electronic navigational chart (ENC) and nautical publications (NP).

**Compilation:** To construct and validate a hydrographic database (HDB) incorporating all relevant hydrographic and topographic source information from analogue and digital formats.

**Product Construction:** To design and produce an SNC and ENC from the HDB.

**Data Assessment and Product Maintenance:** To assess for navigation significant information, maintain the HDB and issue appropriate changes to SNC and ENCs.

**Final Assignment:** To unaided assess, produce SNC and ENC updates and compile a New Edition.

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# MODULE EVAULATIONS

- DISTANCE LEARNING
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- WORK EXPERIENCE

**Practical Exercises** - practical cartographic exercises designed to complement the theory component. Summative exercises contribute to student module evaluation.

**Training Project/Assignments** - 5 weeks supervised and evaluated projects. These projects reflect the level of knowledge outlined in the syllabus, and a report is compiled and evaluated.

**Final Project** – 3 day source assessment and compilation project unsupervised and evaluated.

A module pass mark of **50%** is to be achieved.

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# MODULE PROGRAMME

**DISTANCE LEARNING**

**FOUNDATION**

**IHO S-57 TRANSFER STANDARD**

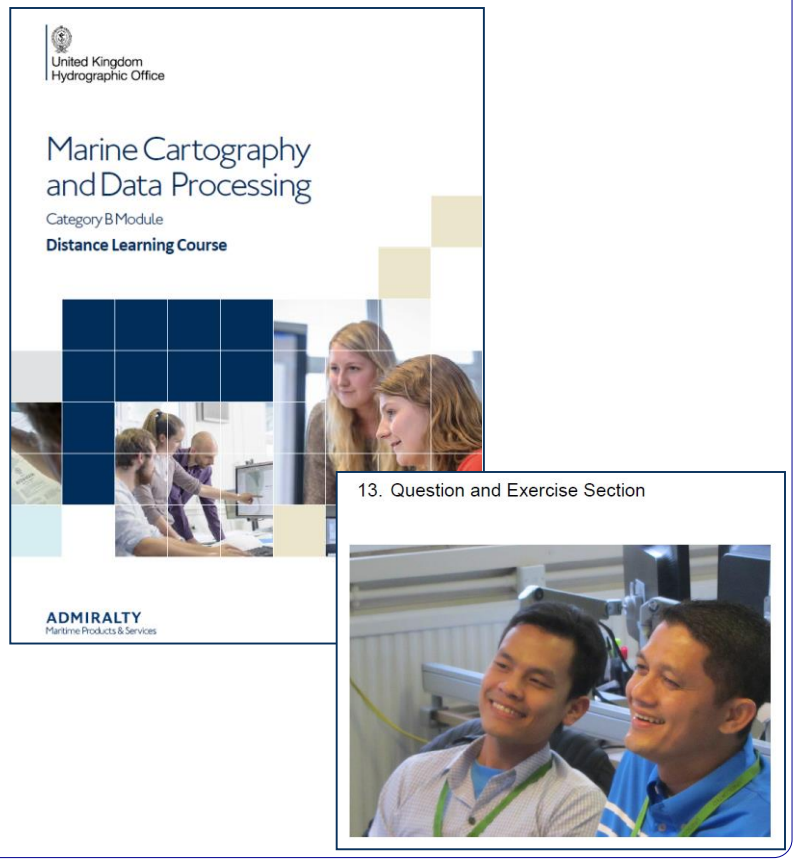
**DATA BASE COMPILATION**

**PRODUCT CONSTRUCTION**

**DATA ASSESSMENT AND PRODUCT MAINTENANCE**

**WORK EXPERIENCE**

## 5 DAYS
### Distance Leaning



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# MODULE PROGRAMME

- DISTANCE LEARNING
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- WORK EXPERIENCE

## 15 DAYS - FUNDAMENTALS OF CHARTING

- Types of charts
- Geodetics
- Projections
- Latitude and Longitude
- Grids
- Bearing and distance
- Chart Datum
- Source material
- Chart Design
- Chart Symbols and text
- Accuracy, precision and reliability
- Hydrography
- Depth Selection and contouring
- Nature of seabed
- Tide theory
- Navigational dangers and Wrecks
- Aids to Navigation
- Navigational Lights
- Law of the Sea
- Nautical Publications
- Routing Measures
- Navigational Buoyage
- Topography
- Magnetics

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# FIELD TRIP

- DISTANCE LEARNING
- **FOUNDATION**
- IHO S-57 TRANSFER STANDARD
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# MODULE EVAULATION

- DISTANCE LEARNING
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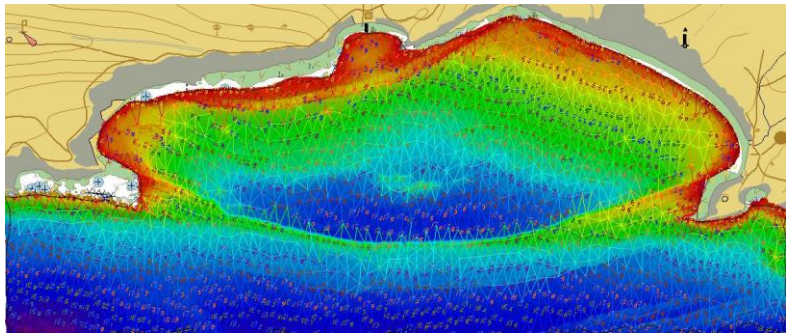
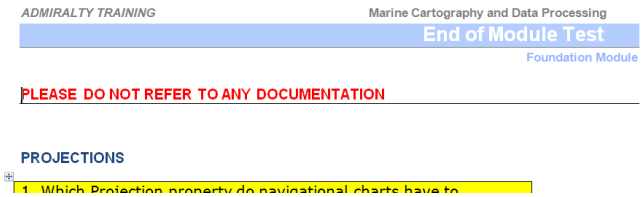
## WORBARROW DEPTH SELECTION ASSIGNMENT



## END OF MODULE THEORY EXAMINATION



*ADMIRALTY TRAINING* Marine Cartography and Data Processing

End of Module Test

Foundation Module

PLEASE DO NOT REFER TO ANY DOCUMENTATION

PROJECTIONS

1. Which Projection property do navigational charts have to

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# MODULE PROGRAMME

- DISTANCE LEARNING
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- **IHO S-57 TRANSFER STANDARD**
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## 10 DAYS

## IHO S-57 Transfer Standard

- Understanding IHO S-57 Transfer Standard
- Overview of S-57 and its publications
- Data Capture Specifications
- Encoding Rocks, Wrecks, Obstructions and Seabed
- Depth areas and meta information
- Lights and Light Supports, Light Sectors
- Capturing Navigational Lines
- Encoding Chart Notes & Picture files
- Encoding Magnetic Variation
- Introduction to Hydrographic Database Production (HDB)
- HDB Quality Procedures

## S-57 SOFTWARE FAMILIARISATION

- CARIS S-57 Composer

## S-57 THEORY TEST

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# FIELD TRIP

- DISTANCE LEARNING
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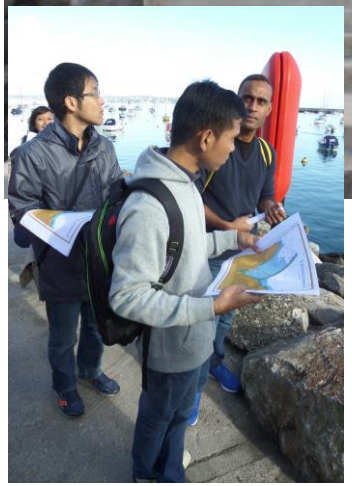
## BRIXHAM - ENC AND REAL WORLD ACQUAINT



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# MODULE EVAULATION

- DISTANCE LEARNING
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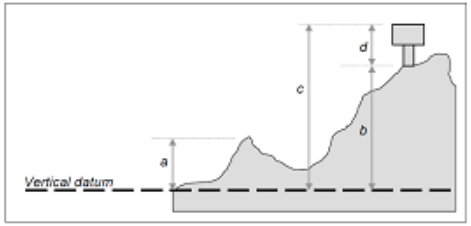
## S-57 THEORY ASSESSMENT

| NAD90 | |
|---|---|
| 7. Which S-57 Object class is used for manmade (artificial) coastline? | |
| SLOCON | |
| CTNARE | |
| COALNE | |
| LNDMRK | |

| 8. How is the –H value obtained? | |
|---|---|
| -H based on the Mean Sea Level | |
| -H based on Mean High Water Spring | |
| -H is based on the Zero depth | |
| -H is based on the value of the highest drying contour indicated in the source document | |

| 9. Which **TWO mandatory** attributes are missing from this light description?<br>Fl. R. 10M | |
|---|---|
| SIGPER | |
| SIGGRP | |
| SIGSEQ | |
| HEIGHT | |




| 10. Vertical Datums diagram – which defines the attribute VERLEN | |
|---|---|
| a | |
| b | |
| c | |
| d | |
| Vertical Datums diagram - which defines the attribute HEIGHT | |
| a | |
| b | |
| c | |
| d | |

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# MODULE PROGRAMME

- DISTANCE LEARNING
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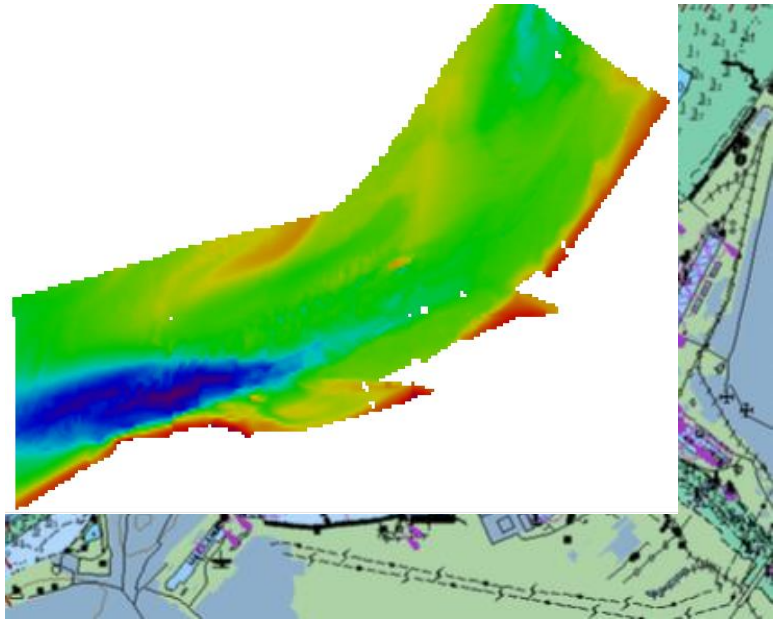
## 15 DAYS

### BRISTOL DATA CAPTURE AND GENERALISATION ASSIGNMENTS



Practical module where the student will compile into a database all the relevant nautical chart content in compliance with IHO S-57 using CARIS S-57 Composer and CARIS Base Editor.

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# FIELD TRIP

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## BRISTOL PORT COMPANY

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# MODULE EVAULATION

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## MARKFRAME

| | | | | | |
|---|---|---|---|---|---|
| 1 | **Bristol - King Road Compilation Project** | | | | |
| 2 | **Student name** | | | | |
| 3 | Marking of bathymetry - after the students have completed the depth selection and created the depth areas/dredged areas make a copy of their hob file by copying the hob file from their products folder. Load up the students cell and run the S-58 test for group 1 coverage, then load the key depths and contours geotiff and score their work. Obtain print out of the hob file (create geotiff of the hob file then load into sdra and printout) to mark up any corrections if necessary. | | | | |
| 4 | **BATHYMETRY** | | | | |
| 5 | **Sounding Selection - see key depths and contours geotiff** | | | | |
| 6 | **Port Approach Surveys** | Marks | | Maximum Score | |
| 7 | Key Shoal Depths in restricted anchorage | 2 | 20 | 40 | |
| 8 | Denny Shoal, Cockburn Rock and Firefly | 2 | 3 | 6 | |
| 9 | Key shoal depths outside restricted anchorage area | 1 | 24 | 24 | |
| 10 | Deeps in deeps | 2 | 4 | 8 | |
| 11 | Adequate depths along NAVLINE | 1 | 4 | 4 | |
| 12 | Depiction of discontinuity between surveys | 10 | | 10 | |
| 13 | Density | 10 | | 10 | |
| 14 | | | | | |
| 15 | **River Surveys** | | | | |
| 16 | Deeps in river S. of restricted anchorage | 1 | 6 | 6 | |
| 17 | Depths along transit lines | 5 | | 5 | |
| 18 | Appropriate river bed depths and density | 10 | | 10 | |
| 19 | | | | | |
| 20 | | | | 123 | 0 |
| 21 | **Contours** | | | | |
| 22 | Contouring correct showing good generalisation | 10 | | 10 | |
| 23 | Check accuracy of digitising - ensure adequate vertices and all contours intersecting | 5 | | 5 | |
| 24 | | | | 15 | 0 |
| 25 | **Depth Areas** | | | | |
| | Full group one cover (DEPARE, | | | | |

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## 10 DAYS - Paper Chart Production

- Compilation and Publication Procedures
- Quality - Introduction to standards and policy documents Verification
- Intellectual Property Rights
- Raster Chart
- Production Overview
- Lithographic/POD Printing and Distribution

## 5 DAYS - ENC Production

- S-58 Validation
- Exchange Set
- RENCs and VARs
- ECDIS
- Data Encryption
- ENC consistency and encoding issues
- Future Standard (S-101)

## Paper Chart and ENC Scheming

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# FIELD TRIP

- DISTANCE LEARNING
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## BRITANNIA ROYAL NAVAL COLLEGE

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# MODULE EVAULATION

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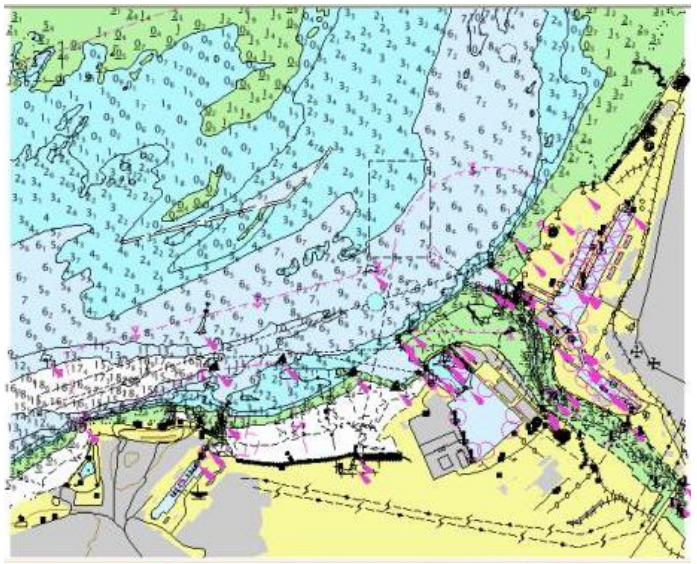
## 10 DAYS

Production of a Paper Chart using CARIS Paper Chart Composer
Verification of the Paper Chart



## 5 DAYS

Production of an ENC base cell including ENC validation and exchange set creation using CARIS S-57 Composer

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- **DATA ASSESSMENT AND PRODUCT MAINTENANCE**
- WORK EXPERIENCE

## 15 DAYS

**DATA ASSESSMENT**
Decision making and the processing of new information using GIS software and traditional checking processes.

**PRODUCT MAINTENANCE**
Notice to Mariner updating of digital and paper products
New Edition maintenance of the ENC and Paper Chart

- Responsibilities of a Hydrographic Office
- Source Material
- Navigational Dangers
- Marine Accidents
- Marine Law and Product Liability
- Bilateral Arrangements
- Maintain Admiralty Products – Types of actions
- Maritime Safety Information – RNW
- Examination of incoming data principles
- Photogrammetric data/remote sensing
- Drafting Notice to Mariners
- ENC updates
- Notice to Mariner Block
- New Edition Principles

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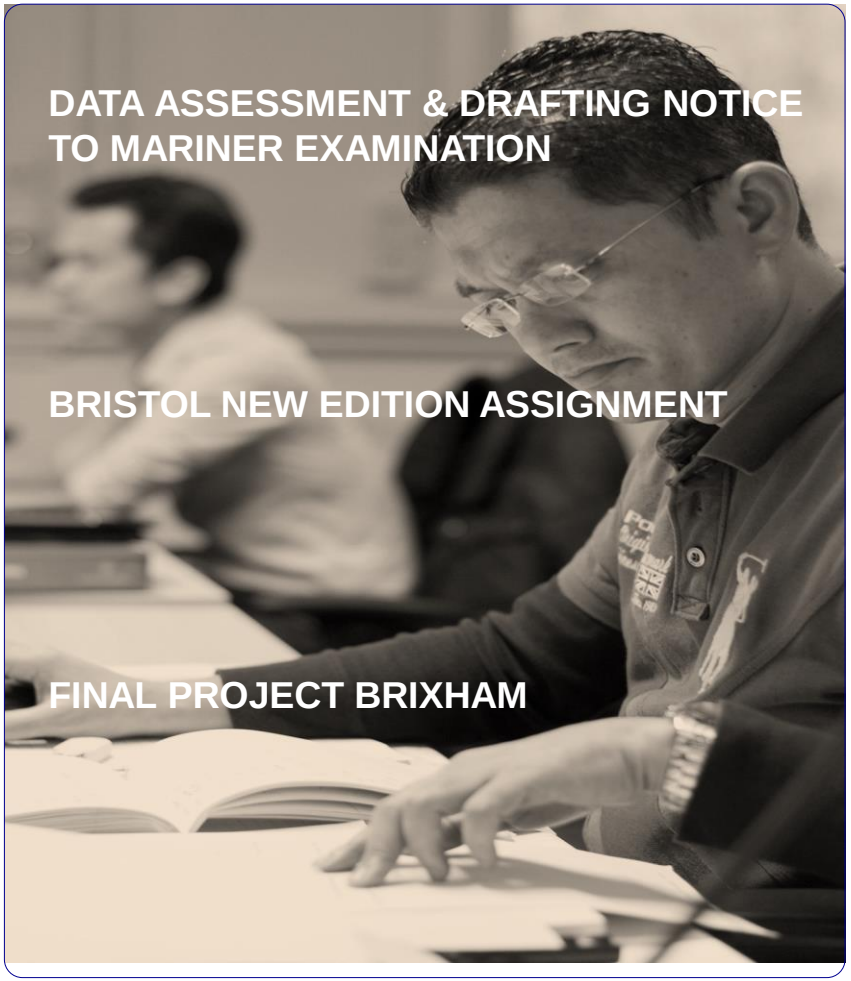

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# PROGRAMME COMPLETION

- DISTANCE LEARNING
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- WORK EXPERIENCE

**MODEL LOG**

At least one year of varied experience in nautical cartographic work is necessary to reach the minimum level of competence.

Planning, chart design, data selection, quality control and quality assurance, chart production and others, are activities envisaged.

The time frame over which a programme is delivered cannot be more than five years.

Production of a work experience logbook is required.

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# ANY QUESTIONS?

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# THANK YOU