

-SQA-SCOTTISH QUALIFICATIONS AUTHORITY

**Hanover House
24 Douglas Street
GLASGOW G2 7NG**

NATIONAL CERTIFICATE MODULE DESCRIPTOR

-Module Number- 0068660 **-Session-1986-87**
-Superclass- ZF

-Title- PRINCIPLES OF NAVIGATION 1

-DESCRIPTION-

Type and Purpose A specialist module which introduces the student to the principles and purposes of navigation.

Preferred Entry Level Standard Grade in Mathematics at 3

Learning Outcomes The student should:

1. know common navigational terms;
2. know basic general astronomy, including the solar system;
3. know the Earth's orbit, rotation and shape;
4. know and use the principles and procedures associated with short distance sailing;
5. know and use the mercator chart and mercator sailing formulae;
6. know and use Napier's Rules for right angled spherical triangles;
7. know the principles underlying great circle and composite great circle sailing.

Content/Context Corresponding to the Learning Outcomes:

1. Basic latitude, longitude, meridian, position lines (coastal/ocean).
2. (a) Identification of principal star types, magnitude and constellations.

- (b) Composition, dimensions, inferior - superior planets and Kepler's Laws.
 - (c) Definition of 'perihelion', 'aphelion', 'apseline' and 'eccentricity'.
3. (a) Earth's elliptical orbit, perihelion, aphelion, eccentricity, inclination of axis, seasons, solstice, equinox.
 - (b) Day/night; length of, throughout year and in different latitudes. Tropics of Cancer and Capricorn, Arctic and Antarctic circles, tropical year, civil year, calendar year and leap year.
 - (c) Earth as an ellipsoid, definition of compression, great circle, small circle, spherical angles and triangles, poles of a great circle, secondary great circle and earth's poles, equator and meridian, latitude, parallel of latitude, prime meridian, longitude, difference in latitude and d', longitude.
 - (d) Geographic and geocentric latitude, sea mile, international nautical mile, cable and knot. Variation in length of sea mile.
 4. Definition of d'lat, d'long, departure, true course, true course angle, rhumb line; solving of problems involving these. Derivation of relationship between departure and d'long. Derivation of plane sailing formula, mean latitude. Use of plane sailing formula, use of Traverse Tables.
 5. Requirements for charts, principles of construction of mercator charts, properties and limitations of mercator chart, natural scale, calculation of chart dimensions, Meridional parts and DMP's. Uses of mercator sailing formula.
 6. Basic Napier's Rules for right angles, spherical triangles.
 7. Advantages of great circles, calculation of great circle and composite great circle sailings, gnomonic projection, vertex, direct or composite track, construction and information available from scale diagrams on plane of a terrestrial meridian illustrating direct great circle routes.

Suggested Learning and Teaching

Active learning and teaching approaches should be used throughout.

Approaches	<p>Films, videos, planetarium visits, diagrams and models should be used as extensively as possible.</p> <p>Films and video should be used to stimulate discussion, not simply to convey information.</p> <p>Group investigations and projects would be useful techniques to employ in this module.</p>
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Assessment Procedures	<p>Learning outcomes 1, 2, 3 and the knowledge components of 4, 5 and 7 should be assessed by a series of short answer questions, satisfactory performance being 70% or better depending on the difficulty of the test set. Testing should take place no later than 2/3 of the way through the module to allow time for remediation and retesting.</p> <p>Learning outcome 6 and the application components of learning outcomes 4, 5 and 7 should be assessed by requiring the student to derive formulae, apply formulae or perform calculations as appropriate, satisfactory performance being 70% or better depending on the difficulty of the test set. Testing should take place no later than 2/3 of the way through the module to allow time for remediation and retesting.</p>
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