

-SQA-SCOTTISH QUALIFICATIONS AUTHORITY

**Hanover House
24 Douglas Street
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NATIONAL CERTIFICATE MODULE DESCRIPTOR

-Module Number- 0068691 **-Session-1986-87**
-Superclass- RF

-Title- **PHYSICAL AND DYNAMICAL METEOROLOGY**

-DESCRIPTION-

Type and Purpose A general module which enables the student to understand the structure and general circulation of the atmosphere and to apply the concepts of physics to the formation of wind, cloud, fog and precipitation.

Preferred Entry Level Standard Grade in Science or Physics at 3

Learning Outcomes The student should:

1. know the structure of the atmosphere;
2. know the heating of the atmosphere and the earth's surface;
3. know the forces producing winds;
4. know the theory of atmospheric stability;
5. know the process of formation of cloud and precipitation;
6. know the causes of poor visibility;
7. know the general circulation of the atmosphere and the main climatic zones over the ocean.

Content/Context Corresponding to the Learning Outcomes:

1. Structure of the atmosphere:
 - (l) composition of 'dry air';

- (ii) vertical temperature profile of lowest 100km.
- 2. Heating of the atmosphere:
 - (i) solar radiation;
 - (ii) terrestrial radiation;
 - (iii) heat balance;
 - (iv) variation of surface temperatures.
- 3. Winds:
 - (i) pressure units, values, isobar, change in pressure;
 - (ii) forces acting on the air;
 - (iii) Geostrophic wind, Gradient wind, Buys Ballot's Law;
 - (iv) local winds.
- 4. Atmospheric stability:
 - (i) environmental lapse rates, isothermals and inversions;
 - (ii) adiabatic changes, dry and saturated adiabatic lapse rates;
 - (iii) 'parcel' theory of atmospheric stability, changes in stability;
 - (iv) Foehn effect.
- 5. Cloud and precipitation:
 - (i) physics of humidity, change of state, units of humidity;
 - (ii) clouds: definitions, classifications, lifting mechanisms;
 - (iii) precipitation: types, process of formation;
 - (iv) formation of dew and frost.
- 6. Causes of poor visibility:
 - (i) composition and definitions of fog, mist and haze;

- (ii) formation, areas and seasons of radiation advection, sea smoke, frontal and mixing fog.
7. General circulation of the atmosphere:
- (i) pressure distribution and prevailing winds in January and July;
 - (ii) characteristics and location of climatic zones over the oceans;
 - (iii) monsoons.

Suggested Learning and Teaching Approaches

Corresponding to the Learning Outcomes

- 1,2, 3. A mainly didactic approach preferably 'step by step' lectures. Models, if available, should be used.
- 4. Partly didactic with some numerical tutorial examples used to introduce the general concepts.
- 5. Partly didactic plus audio-visual material such as slides, films and video. (The Royal Meteorological Society have a catalogue of this material).
- 6&7 Mainly didactic plus discussions based upon the students' experiences at sea.

Assessment Procedures

Learning outcomes 1- 7 inclusive 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.