-SQA- SCOTTISH QUALIFICATIONS AUTHORITY

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NATIONAL CERTIFICATE MODULE DESCRIPTOR

-Module Number-	**3161121**	**-Session- 1991-92**
-Superclass-	**RA**	

-Title- **INTRODUCING SCIENCE INVESTIGATION SKILLS ($x^1/_2$)**

-DESCRIPTION-

Purpose	This module is designed to introduce the student to the techniques used in scientific investigations. The student will develop his/her ability to apply scientific knowledge and practical skills in problem-solving situations. The module could be done in conjunction with 3161101 Science in Context 1 and 3161131 Science Practical Skills (x 1/2). The module will also complement the Stage 1 Biology, Chemistry and Physics modules.
Preferred Entry Level	3161011 Measuring and Recording in Science (x 1/2) or Standard Grade in Science at Grade 5.
Outcomes	The student should: 1. outline the agreed strategy for a given science investigation; 2. test a hypothesis using practical procedures; 3. interpret the results of an investigation.
Assessment Procedures	Acceptable performance in the module will be satisfactory achievement of all the Performance Criteria specified for each Outcome. The following abbreviations are used below: PC Performance Criteria IA Instrument of Assessment

Note: The Outcomes and PCs are mandatory and cannot be altered. The IA may be altered by arrangement with SQA. (Where a range of performance is indicated, this should be regarded as an extension of the PCs and is therefore mandatory.)

It is recommended that assessment of Outcomes 1-3 is related to one investigation. Each Outcome should be assessed, however, before the student proceeds to the next one. The investigation must be undertaken individually for assessment purposes.

OUTCOME 1 **OUTLINE THE AGREED STRATEGY FOR A GIVEN SCIENCE INVESTIGATION**

PCs

(a) The identification of the aim of the investigation is correct.
(b) The identification of factors which may affect the investigation is correct.
(c) The agreed hypothesis is appropriate to the investigation.
(d) The agreed method for testing the hypothesis is appropriate to the investigation.

IA Structured Question

A structured question to assess the student's ability to outline a strategy for a given science investigation in consultation with the tutor.

The student will be required to complete a given structured worksheet.

Satisfactory achievement of the Outcome will be demonstrated by the student achieving all the Performance Criteria.

OUTCOME 2 **TEST A HYPOTHESIS USING PRACTICAL PROCEDURES**

PCs

(a) The procedures carried out are in accordance with the agreed method and take account of safety and good laboratory and/or hygienic practices.
(b) The results obtained are valid and reliable.
(c) The presented results are in an appropriate format.

IA Assignment

An assignment to assess the student's ability to test the hypothesis using practical procedures
which have been approved. The procedures should be related to the strategy outlined in Outcome 1.

The student will be required to carry out the practical procedures to the required standard and select and use an appropriate format to present the results.

A checklist should be devised to ensure a reliable interpretation of the student's practical performance.

Satisfactory achievement of the Outcome will be demonstrated by the student achieving all the Performance Criteria.

OUTCOME 3 INTERPRET THE RESULTS OF AN INVESTIGATION

PCs
(a) The conclusion drawn is valid.
(b) The confirmation or rejection of the hypothesis is correct with respect to the conclusion.

IA Structured Question

A structured question to assess the student's ability to interpret the results of an investigation. The interpretation should be
related to the results obtained in Outcome 2.

The student will be required to complete a given structured worksheet.

Satisfactory achievement of the Outcome will be demonstrated by the student achieving both Performance Criteria.

The following sections of the descriptor are offered as guidance.
They are not mandatory.

CONTENT/CONTEXT

Corresponding to Outcomes 1-3:

The module could be offered in a biology, chemistry, physics or broad science context.

(a) Examples of biology investigations:

(i) the effect of temperature/pH on enzyme activity;
(ii) choice chamber experiment(s);
(iii) comparative energy values of foodstuffs;
(iv) the effect of light intensity on oxygen production by Canadian pondweed.

(b) Examples of chemistry investigations:

(i) an investigation to consider factors affecting the rate of a reaction;
(ii) an investigation to predict the products of a particular electrolysis experiment;
(iii) an investigation concerning the nature of the products obtained by catalytic cracking.

(c) Examples of physics investigations:

(i) an investigation to consider factors affecting the resistance of a wire;
(ii) an investigation to consider factors affecting the strength of an electromagnet;
(iii) an investigation of the factors affecting the speed of a runaway vehicle on a slope.

SUGGESTED LEARNING AND TEACHING APPROACHES

A student-centred, resource-based approach is essential for this module.

Small assignments should be undertaken to demonstrate the principles of scientific investigations. Such assignments could be undertaken in groups. The investigation for assessment purposes must be undertaken individually. Opportunities to use new technology should be considered.

Students should have access to laboratory resources.

Practical Procedures must be approved by the tutor. Safety considerations must be observed at all times.

Outcomes should be integrated within an investigation.

It is recommended that the tutor assesses the student at the stage at which they have demonstrated an ability to carry through an investigation. Where a student is unsuccessful in achieving an Outcome, provision should be made for remediation and reassessment.
