NATIONAL CERTIFICATE MODULE DESCRIPTOR

-Module Number-	**7311041**	**-Session-1991-92**
-Superclass-	**RH**	

-Title-   **GENETICS ($x^1/_2$)**

-DESCRIPTION-

Purpose

This module provides students with the means of extending their knowledge of inheritance.

The module is suitable for inclusion in Biology or Human Biology programmes and in conjunction with other Stage 2 Biology modules could be a preparation for Higher Education.

Preferred Entry Level

7310031 Introducing Inheritance, or Standard Grade Biology at Grade 3.

Outcomes

The student should:

1. explain the genetic importance of meiosis;

2. explain the genetic consequences of chromosomal change;

3. apply the concept of genetics to the solution of genetic problems.

Assessment Procedures

Acceptable performance in this 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.)

OUTCOME 1   **EXPLAIN THE GENETIC IMPORTANCE OF MEIOSIS**

PCs   (a)   The description of the process of meiosis is correct with respect to:

(i)   behaviour of homologues;
(ii)   crossing over;
(iii)   chromosome number.

(b)   The explanation of the importance of meiosis is correct in relation to:

(i)   random assortment;
(ii)   linkage;
(iii)   variation.

IA   Objective Questions

6 objective questions to assess the student's ability to explain the genetic importance of meiosis.

The questions should be allocated as follows:

PC (a) 3 questions (one on each part of the PC)
   (b) 3 questions (one on each part of the PC)

Several types of objective questions would be suitable for the above assessments.

Satisfactory achievement of the Outcome will be demonstrated by the student achieving the correct response to all 6 questions.

OUTCOME 2   **EXPLAIN THE GENETIC CONSEQUENCES OF CHROMOSOMAL CHANGE**

PCs   (a)   The description of chromosomal change is correct with respect to:

(i)   inversion;
(ii)   duplication;
(iii)   deletion;
(iv)   translocation;
(v)   non-disjunction.

(b)   The explanation of the consequences of chromosomal changes is correct with respect to:

   (i)   chromosome number;
   (ii)   polyploidy.

IA   Objective Questions

9 objective questions to assess the student's ability to explain the genetic consequences of chromosomal change.

The questions should be allocated as follows:

PC (a) 5 questions (one on each part of the PC)
   (b) 4 questions (two for each part of the PC)

Several types of objective questions would be suitable for the above assessments.

Satisfactory achievement of the Outcome will be demonstrated by the student achieving the correct response to all 9 questions.

OUTCOME 3   **APPLY THE CONCEPT OF GENETICS TO THE SOLUTION OF GENETIC PROBLEMS**

PCs   (a)   The solutions of problems involving given dihybrid crosses are correct in terms of:

   (i)   genotypic ratios;
   (ii)   phenotypic ratios;
   (iii) linked genes.

   (b)   The solutions of problems involving given crosses are correct in terms of:

   (i)   sex ratios;
   (ii)   sex linkage;
   (iii) multiple alleles;
   (iv)   incomplete dominance.

IA   Structured Questions

5 structured questions to assess the student's ability to apply the concept of genetics to the solution of genetic problems.

The questions should be allocated as follows:

PC (a) 2 questions
PC (b) 3 questions

Each part of the Performance Criteria must be assessed at least once within the questions.

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

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

CONTENT/CONTEXT

Relating to Outcomes 1-3:

1.	Meiosis -	formation of homologous pairs, process of crossing over, names of stages limited to: interphase, prophase, metaphase, anaphase, telophase. Halving of chromosomal number.
		Independent assortment, crossover frequency, variation.
2.	Chromosomal Change -	alteration in the genes. Chromosomal abnormalities eg. Down's , Turners's, Klinefelter's syndromes. Polyploidy - alteration in total sets of chromosomes, causing increased yield, size, vigour, hybridisation.
3.	Genetic Problems -	The student should be able to solve a wide range of genetic crosses to cover the requirements of the PCs.

SUGGESTED LEARNING AND TEACHING APPROACHES

During the work of the module students should have several opportunities to practice their skills.   Each student should be assessed at appropriate points throughout the module.   Where a student is unsuccessful in achieving an Outcome, provision should be made for remediation and reassessment.

A student-centred, resource-based approach is likely to be the most flexible for this module.   The Outcomes can be integrated so that concepts can be developed and practical exercises using live materials should be encouraged to illustrate concepts.

Selection of data, tabulating and drawing conclusions are examples of a problem-solving approach appropriate for establishing concepts.   The student should be encouraged to lay out genetic crosses in the standard format and express ratios in their simplest form.

Resource materials in the form of publications, audio-visual material and computer software may be available.

This module could be integrated with 7311011 Nuleic Acids and Protein Synthesis (x $^1/_2$) or other Stage 2 Biology modules.