

-SQA-SCOTTISH QUALIFICATIONS AUTHORITY

**Hanover House
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NATIONAL CERTIFICATE MODULE DESCRIPTOR

-Module Number- 0091064 -Session-1989-90

-Superclass- RB

-Title- MATHEMATICS: STATISTICS 2

-DESCRIPTION-

Purpose This module is designed for the student who requires a basic knowledge of statistics as part of his/her mathematical studies. It will also enable the student to apply statistical methods to practical situations and provide the foundation from which further work on statistics can be developed. Refer to the Appendix for guidance on the framework of the mathematics modules.

Preferred Entry Level 81058 Mathematics: Analysis/Algebra 1 or
81063 Mathematics: Statistics 1 and
(81057 Mathematics: Grade 3 or Standard Grade in Mathematics at 3)

Learning Outcomes The student should:

1. collect, process and present numerical data;
2. use simple probability;
3. use probability distributions;
4. apply mathematical knowledge and skills in a problem solving context.

Suggested Learning and Teaching Approaches Wherever reasonable the statistical concepts and techniques in this module should be illustrated using real-life examples.

Lengthy computations can be avoided by appropriate use of calculators and computer packages. For example students can more easily use realistic data in projects if they have access to a spread sheet package or a specialist statistical package.

Consolidation of numerical skills should not consist entirely of mechanical exercises, but should include problem solving assignments.

Students should maintain a workfile. This should form a complete record of the student's work throughout the module. The tutor should ascertain periodically throughout the module that each student is maintaining the workfile adequately. The workfile should contain (as appropriate) the student's notes, class handouts, completed worksheets, exercises, assignments, reports(s) or investigation(s), report(s) of project(s), log book of computer activities and a summary of the important details of the module for later revision purposes.

Assessment Procedures

Acceptable performance in the module will be satisfactory achievement of all the performance criteria specified for each Learning Outcome.

The following abbreviations are used below:

LO Learning Outcome
 IA Instrument of Assessment
 PC Performance Criteria

LO1 COLLECT, PROCESS AND PRESENT
 NUMERICAL DATA

PC The student:

- (a) identifies examples of data as continuous or discrete;
- (b) uses random number tables to choose a random sample and collects data from the sample;
- (c) calculates mean and standard deviation for raw data and for ungrouped and grouped frequency distributions;
- (d) constructs a histogram and a frequency polygon.

IA Matching and Calculation Exercise

Topics should be assessed on the number of occasions indicated:

- (a) discrete and continuous data 8
- (b) random sampling 1
- (c) calculation of mean and standard 3 deviation
- (d) graphical display of frequency 2 distributions with unequal class intervals

One question may cover more than one topic.

Satisfactory achievement of the Learning Outcome will be demonstrated by the student producing at least 6 correct responses for (a) and the correct responses for (b), 3 correct responses for (c) and 2 correct responses for (d).

LO2 USE SIMPLE PROBABILITY

PC The student:

- (a) calculates probability as relative frequency;
- (b) identifies mutually exclusive events and independent events;
- (c) uses the addition law
 $P(A \text{ OR } B) = P(A) + P(B) - P(A \text{ AND } B)$;
- (d) uses the multiplication law
 $P(A \text{ AND } B) = P(A) \times P(B|A)$;
- (e) draws tree diagrams and uses them to calculate probabilities.

IA Matching and Calculation Exercise

Topics should be assessed on the number of occasions indicated:

- (a) calculation of probability 1
- (b) mutually exclusive events and 3 independent events (including one example of neither)
- (c) the addition law 2
- (d) the multiplication law 2
- (e) tree diagrams 2

One question may cover more than one topic.

Satisfactory achievement of the Learning Outcome will be demonstrated by the student producing the correct responses for (a), 3 correct responses for (b) and at least 5 correct responses for (c) and (d) and (e) together.

LO3 USE PROBABILITY DISTRIBUTIONS

PC The student:

- (a) calculates binomial probabilities when the number of trials, is less than 5 or when, the number of successes, is less than 4;
- (b) calculates Poisson probabilities;
- (c) obtains binomial and Poisson probabilities from statistical tables;
- (d) calculates standard scores and obtains Normal probabilities from statistical tables;
- (e) selects the appropriate probability distribution for a given situation.

IA Calculation Exercise.

Topics should be assessed on the number of occasions indicated:

- (a) calculation of Binomial probabilities 3
- (b) calculation of Poisson probabilities 3
- (c) use of Tables of cumulative Binomial 4 and Poisson probabilities
- (d) use of Tables to obtain Normal 4 probabilities
- (e) choice of the correct probability 4 distribution

One question may cover more than one topic.

Satisfactory achievement of the Learning Outcome will be demonstrated by the student producing at least 5 correct responses for (a) and (b) together and at least 3 correct responses for each of (c) (d) and (e).

LO4 APPLY MATHEMATICAL KNOWLEDGE AND SKILLS IN A PROBLEM SOLVING CONTEXT

PC The student:

- (a) interprets the problem;
- (b) selects a strategy to solve the problem;
- (c) obtains a satisfactory solution;
- (d) communicates the solution accurately and logically.

IA Assignment

4 problems to test the student's ability to draw together various mathematical ideas and techniques developed in the module. The problems should be expressed in a practical context and each must test the 4 processes in the performance criteria. The 4 problems should take approximately one hour in total to complete.

Satisfactory achievement of the Learning Outcome will be demonstrated by the student completing all 4 processes in the performance criteria for at least 2 of the questions.