SCOTTISH QUALIFICATIONS AUTHORITY

National Unit Specification: general information

UNIT Statistics 1 (Advanced Higher)

NUMBER D326 13

COURSE Applied Mathematics (Advanced Higher)

SUMMARY

This unit is the first of two Advanced Higher units which, together with one optional unit, comprise one of the variants of the Advanced Higher Applied Mathematics course, and is an optional unit of the Advanced Higher Mathematics course. It is also an optional unit for the other variants of the Advanced Higher Applied Mathematics course. It builds on the work of Statistics (H) and introduces special distributions, sampling, estimation and hypothesis testing. The unit provides a basis for progression to Statistics 2 (AH).

OUTCOMES

1 Use conditional probability and the algebra of expectation and variance.
2 Use probability distributions in simple situations.
3 Identify sampling methods and estimate population parameters.
4 Use a z-test on a statistical hypothesis where the significance level is given.
5 Undertake a statistical assignment.

RECOMMENDED ENTRY

While entry is at the discretion of the centre, candidates will normally be expected to have attained:

- Higher Mathematics award including Statistics (H)

Administrative Information

Superclass: RB

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Version: 03

National Unit Specification: general information (cont)

UNIT Statistics 1 (Advanced Higher)

CREDIT VALUE

1 credit at Advanced Higher.

CORE SKILLS

Core skills for Advanced Higher remain subject to confirmation and details will be available at a later date.

Additional information about core skills is published in *Automatic Certification of Core Skills in National Qualifications* (SQA, 1999).

National Unit Specification: statement of standards

UNIT Statistics 1 (Advanced Higher)

Acceptable performance in this unit will be the satisfactory achievement of the standards set out in this part of the unit specification. All sections of the statement of standards are mandatory and cannot be altered without reference to the Scottish Qualifications Authority.

OUTCOME 1

Use conditional probability and the algebra of expectation and variance.

Performance criteria

(a) Calculate a conditional probability.
(b) Apply the laws of expectation and variance in simple cases.

OUTCOME 2

Use probability distributions in simple situations.

Performance criteria

(a) Use the binomial distribution.
(b) Use the Poisson distribution.
(c) Use the normal distribution.

OUTCOME 3

Identify sampling methods and estimate population parameters.

Performance criteria

(a) Identify a given sampling method.
(b) Estimate a population parameter from a sample statistic.

OUTCOME 4

Use a z-test on a statistical hypothesis where the significance level is given.

Performance criteria

(a) State null and alternative hypotheses.
(b) State one-tail or two-tail test.
(c) Determine the p-value.
(d) State and justify an appropriate conclusion.

National Unit Specification: statement of standards (cont)

UNIT Statistics 1 (Advanced Higher)

Evidence requirements

Although there are various ways of demonstrating achievement of the outcomes, evidence would normally be presented in the form of a closed book test under controlled conditions. Examples of such tests are contained in the National Assessment Bank.

In assessment, candidates should be required to show their working in carrying out algorithms and processes.

OUTCOME 5

Undertake a statistical assignment.

Performance criteria

(a) Pose the question that the assignment addresses.
(b) Collect (generate) the relevant data.
(c) Analyse the data.
(d) Interpret and communicate the conclusions.

Evidence requirements

The assignment must satisfy the performance criteria, using the statistical content of the unit. A full report is to be written by the candidate individually. This report may include sets of data, graphs, computer printout, calculated statistics, consideration of probability and a conclusion.

National Unit Specification: support notes

UNIT Statistics 1 (Advanced Higher)

This part of the unit specification is offered as guidance. The support notes are not mandatory.

While the time allocated to this unit is at the discretion of the centre, the notional design length is 40 hours.

GUIDANCE ON CONTENT AND CONTEXT FOR THIS UNIT

Each mathematics unit at Advanced Higher level aims to build upon and extend candidates' mathematical knowledge and skills with the emphasis on the application of mathematical ideas and techniques to relevant and accessible problems. This unit is designed with the two-fold objective of providing a rounded experience of statistics for candidates who take the unit free-standing or as the third unit of the Advanced Higher Mathematics course or Advanced Higher Applied Mathematics course and, at the same time, forming a sound basis for progression to Statistics 2 (AH) for candidates specialising in statistics in the Advanced Higher Applied Mathematics course.

The first outcome of this unit extends the earlier work on probability to conditional probability and allows candidates the opportunity to study the algebra of expectation and variance.

Outcome 2 assumes knowledge of the Statistics (H) outcome on discrete probability distributions and extends the study to special distributions.

Outcome 3 requires demonstration of competence in sampling methods and estimation of population parameters, for which experience of the Statistics (H) outcome on exploratory data analysis is of some advantage. Outcome 4 introduces the concept of hypothesis testing. Candidates are given the opportunity to apply statistical processes in Outcome 5 where competence will be demonstrated by completing an assignment.

The recommended content for this unit can be found in the course specification. The *detailed content* section provides illustrative examples to indicate the depth of treatment required to achieve a unit pass and advice on teaching approaches.

National Unit Specification: support notes (cont)

UNIT Statistics 1 (Advanced Higher)

GUIDANCE ON LEARNING AND TEACHING APPROACHES FOR THIS UNIT

The investigative approaches to teaching and learning consistently recommended at earlier levels are equally beneficial at Advanced Higher level.

Where appropriate, statistical topics should be taught and skills in applying statistics developed through real-life contexts. Candidates should be encouraged throughout this unit to make efficient use of the arithmetical, mathematical, statistical and graphical features of calculators, to be aware of the limitations of the technology and always to apply the strategy of checking.

Numerical checking or checking a result against the context in which it is set is an integral part of every mathematical process. In many instances, the checking can be done mentally, but on occasions, to stress its importance, attention should be drawn to relevant checking procedures throughout the mathematical process. There are various checking procedures which could be used:

- relating to a context – 'How sensible is my answer?'
- estimate followed by a repeated calculation
- calculation in a different order

Further advice on learning and teaching approaches is contained within the subject guide for Applied Mathematics.

GUIDANCE ON APPROACHES TO ASSESSMENT FOR THIS UNIT

The assessment for this unit will normally be in the form of a closed book test. Such tests should be carried out under supervision and it is recommended that candidates attempt an assessment designed to assess all the outcomes within the unit. Successful achievement of the unit is demonstrated by candidates achieving the threshold of attainment specified for all outcomes in the unit. Candidates who fail to achieve the threshold(s) of attainment need only be retested on the outcome(s) where the outcome threshold has not been attained. Further advice on assessment and retesting is contained within the National Assessment Bank.

The fifth outcome is assessed by means of a statistical assignment. Examples of such assignments, with marking schemes, are contained within the National Assessment Bank.

In assessments, candidates should be required to show their working in carrying out algorithms and processes.

SPECIAL NEEDS

This unit specification is intended to ensure that there are no artificial barriers to learning or assessment. Special needs of individual candidates should be taken into account when planning learning experiences, selecting assessment instruments or considering alternative outcomes for units. For information on these, please refer to the SQA document *Guidance on Special Assessment and Certification Arrangements for Candidates with Special Needs/Candidates whose First Language is not English* (SQA, 1998).