Draft National Unit Specification

Unit title: Data Analysis and Modelling (Advanced Higher)

SCQF: level 7 (8 SCQF credit points)

Unit code: to be advised

Unit outline

The general aim of this Unit is to introduce the study of probability models. Learners will develop skills in data collection, presentation and interpretation, will study the notion of probability and will be introduced to some probability models. The theory behind the models will be explained, exploratory data analysis used as an indicator and the uses of different random variables explored.

Learners who complete this Unit will be able to:

1 Use statistical skills linked to data analysis and modelling

This Unit is a mandatory Unit of the Advanced Higher Applied Mathematics (Statistics) Course and is also available as a free-standing Unit. The Unit Specification should be read in conjunction with the *Unit Support Notes*, which provide advice and guidance on delivery, assessment approaches and development of skills for learning, skills for life and skills for work. Exemplification of the standards in this Unit is given in the *National Assessment Resource*.

The *Course Assessment Specification* for the Advanced Higher Applied Mathematics (Statistics) Course gives further mandatory information on Course coverage for learners taking this Unit as part of the Advanced Higher Applied Mathematics (Statistics) Course.

Recommended entry

Entry to this Unit is at the discretion of the centre. However, learners would normally be expected to have attained the skills, knowledge and understanding required by one or more of the following or equivalent qualifications and/or experience:

- Higher Mathematics Course or relevant component Units

Equality and inclusion

This Unit Specification has been designed to ensure that there are no unnecessary barriers to learning or assessment. The individual needs of learners should be taken into account when planning learning experiences, selecting assessment methods or considering alternative evidence. For further information please refer to the *Unit Support Notes.*

Standards

Outcomes and assessment standards

Outcome 1

The learner will:

1 Use statistical skills linked to data analysis and modelling by:

1.1 Applying skills to data collection, presentation and interpretation
1.2 Applying skills to probability theory
1.3 Applying skills to discrete random variables
1.4 Applying skills to particular probability distributions

Evidence Requirements for the Unit

Assessors should use their professional judgement, subject knowledge and experience, and understanding of their learners, to determine the most appropriate ways to generate evidence and the conditions and contexts in which they are used. They should ensure there is sufficient evidence of competence in mathematical skills from the Outcomes and Assessment Standards to allow a judgement to be made that the learner has achieved the Unit.

Assessors should use their professional judgement when giving learners credit for an appropriate degree of accuracy. This may mean giving credit for incomplete solutions or numerically incorrect solutions which show correct methodology, therefore demonstrating required knowledge and understanding of the mathematical processes involved.

A calculator or equivalent technologies may be used.

For **Outcome 1**, learners will be required to provide evidence for each Assessment Standard linked by drawing on the following:

Skills appropriate to application (1.1)
- Exploratory data analysis — drawing and interpreting dotplots, stem-and-leaf diagrams, boxplots and scatterplots.
- Simple random sampling — understanding what constitutes random sampling and being able to generate a random sample of a given size and range using a calculator or speadsheet.

Skills appropriate to application (1.2)
- Probability theory — calculating simple and conditional probabilities, including the use of Bayes' theorem.

Skills appropriate to application (1.3)
- Random variables — showing an understanding of how different random variables are modelled, understanding the difference between discrete and continuous variables.
- Laws of expectation and variance — applying $E(aX + b) = aE(X) + b$; $E(X \pm Y) = E(X) \pm E(Y)$; $V(aX + b) = a^2V(X)$ and $V(X \pm Y) = V(X) + V(Y)$

Skills appropriate to application (1.4)

- Binomial expansion — using the binomial theorem to expand expressions which may include two variables, a negative coefficient and index being a positive integer.
- Uniform, binomial and Poisson distributions — calculating probabilities, with the aid of tables or a calculator, given the distribution of a random variable.
- Normal distribution — calculating probabilities and *z*-scores and using normal approximations to the binomial and Poisson distributions, including the use of a continuity correction.

Exemplification of assessment is provided in the *National Assessment Resource*. Advice and guidance on possible approaches to assessment is provided in the *Unit Support Notes*.

Development of skills for learning, skills for life and skills for work

It is expected that learners will develop broad, generic skills through this Unit. The skills that learners will be expected to improve on and develop through the Unit are based on SQA's *Skills Framework: Skills for Learning, Skills for Life and Skills for Work* and drawn from the main skills areas listed below. These must be built into the Unit where there are appropriate opportunities.

2 Numeracy

2.1 Number processes
2.2 Money, time and measurement
2.3 Information handling

5 Thinking skills

5.3 Applying
5.4 Analysing and evaluating

Amplification of these is given in SQA's *Skills Framework: Skills for Learning, Skills for Life and Skills for Work.* The level of these skills should be at the same SCQF level as the Unit and be consistent with the SCQF level descriptor. Further information on building in skills for learning, skills for life and skills for work is given in the *Unit Support Notes.*

Administrative information

Published: October 2012 (draft version 1.0)

Superclass: to be advised

History of changes

Version	Description of change	Authorised by	Date