Advanced Higher Course Specification

Advanced Higher Statistics Course Specification

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Please refer to the note of changes at the end of this Course Specification for details of changes from previous version (where applicable).

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Course outline

Course title: Advanced Higher Statistics

SCQF: level 7 (32 SCQF credit points)

Course code: to be advised

Mandatory Units

Data Analysis and Modelling (Advanced Higher)	**8 SCQF credit points**
Statistical Inference (Advanced Higher)	**8 SCQF credit points**
Hypothesis Testing (Advanced Higher)	**8 SCQF credit points**

Course assessment **8 SCQF credit points**
This Course includes eight SCQF credit points to allow additional time for preparation for Course assessment. The Course assessment covers the added value of the Course. Further information on the Course assessment is provided in the Assessment section.

Recommended entry

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

- Higher Mathematics Course

Progression

This Course or its Units may provide progression to:

- other qualifications in Mathematics or related areas
- further study, employment and/or training

Further details are provided in the Rationale section.

Equality and inclusion

This Course 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 *Course Support Notes* and the *Course Assessment Specification.*

Rationale

All new and revised National Courses reflect Curriculum for Excellence values, purposes and principles. They offer flexibility, provide more time for learning, more focus on skills and applying learning, and scope for personalisation and choice.

In this Course, and its component Units, there will be an emphasis on skills development and the application of those skills. Assessment approaches will be proportionate, fit for purpose and will promote best practice, enabling learners to achieve the highest standards they can.

This Course provides learners with opportunities to continue to acquire and develop the attributes and capabilities of the four capacities, as well as skills for learning, skills for life and skills for work.

All Courses provide opportunities for learners to develop breadth, challenge and application, but the focus and balance of the assessment will be appropriate for the subject area.

Relationship between the Course and Curriculum for Excellence values, purposes and principles

In a world heavily dependent on interpreting the wealth of available data, statistics is clearly important in allowing us to make sense of and manage our lives. Using mathematics and statistics enables us to model real-life situations and to make connections and informed predictions. It equips us with the skills we need to interpret and analyse information, simplify and solve problems, assess risk and make informed decisions.

Because statistics enables us to make independent and reasoned decisions, it engages and fascinates learners of all ages, interests and abilities. Learning in mathematics and statistics develops logical reasoning, analysis, problem solving skills, creativity and the ability to think in abstract ways. It uses a universal language of numbers and symbols, which allows us to communicate ideas in a concise, unambiguous and rigorous way. Statistics allows links to be made between mathematical models and the real world, facilitating reasoned argument based on sound logic. Understanding the part that statistics plays in almost all aspects of life is crucial. This reinforces the need for mathematics and statistics to play an integral part in lifelong learning and be appreciated for the richness it brings.

With the current prevalence for unfounded statistical assertions in the media, statistical principles of learning can enable all citizens to take personal responsibility for making their own decisions and to play a fuller part in the wider community.

Purpose and aims of the Course

Statistics seeks to make sense of inherent natural variation in a wide variety of contexts, eg the National Lottery, association between lifestyle choices and health outcomes.

The Course explores the collection, analysis and interpretation of data. It develops an understanding of degree of certainty which can be attributed to inferences made and conclusions reached when interpreting and analysing data.

The Course should motivate and challenge learners by enabling them to:

- understand the appropriateness of different methods of data collection, particularly ways of sampling from a population
- select and use appropriate statistical models to assist with the analysis of data
- consider and evaluate assumptions required for chosen models
- understand the notion of probability
- interpret results in context, evaluating the strength and limitations of their models
- develop skills in effectively communicating conclusions reached on the basis of statistical analysis

The Course is highly relevant for modelling and data analysis in many areas, including medicine, actuarial science, economics and other social sciences, business and management, and offers a solid foundation in the exploration of probability theory, random variables, hypothesis testing and confidence intervals.

Information about typical learners who might do the Course

This Course is suitable for learners who are secure in their attainment of the Higher Mathematics Course or an equivalent qualification.

Learners will develop skills in selecting and applying statistical techniques in a wide variety of real-life contexts. These skills will enable progression to further learning and to employment.

Statistical techniques are vital in today's world to analyse data and make sense of the many aspects of a situation. They are used in business and government to determine the present state of affairs and to form a plan of action. Statistics can also be used to monitor progress and record achievement. Learners will find uses in many careers in these areas, such as actuarial work, financial services, sport analysis, economics, media work, as well as in science, medicine, the humanities and technology.

Course structure and conditions of award

Course structure

This Course introduces learners to experimental design, and instils and nurtures the ability of learners to indulge in good analytical practice on data sets. It develops the ability to make informed judgements on calculated statistics and to communicate appropriate conclusions.

The Advanced Higher Statistics Course has three Units, totalling 24 SCQF credit points, with an additional eight SCQF credit points to allow the use of an extended range of learning and teaching approaches, consolidation of learning, integration, and preparation for external assessment.

Units are statements of standards for assessment and not programmes of learning and teaching. They can be delivered in a number of ways.

Data Analysis and Modelling (Advanced Higher)
The general aim of this Unit is to introduce the study of probability models. Learners will develop skills in data collection, presentation, and interpretation and will study the notion of probability and 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.

Statistical Inference (Advanced Higher)
The general aim of this Unit is to develop and apply skills in statistical inference. Learners will select and use appropriate statistical models to assist with the analysis of data and interpret results in context, evaluating the strength and limitations of their models. The practicalities of working with sample data to consider possible population distributions and to obtain best estimates of a population mean are introduced. The importance of the distribution of sample means is highlighted, and the power of the central limit theorem is outlined and used to evaluate the accuracy of the estimated population mean. A statistical investigation generated by the learner will be carried out using the skills developed in the Unit.

Hypothesis Testing (Advanced Higher)
The general aim of this Unit is develop and apply skills in hypothesis testing. These tests will be parametric, non-parametric and bi-variate. Learners will develop skills in effectively communicating conclusions reached on the basis of statistical analysis. A statistical hypothesis test generated by the learner will be carried out using the skills developed in the Unit.

Conditions of award

To gain the award of the Course, the learner must pass all of the Units as well as the Course assessment. The required Units are shown in the Course outline section. Course assessment will provide the basis for grading attainment in the Course award.

Skills, knowledge and understanding

Further information on the assessment of skills, knowledge and understanding for the Course is given in the *Course Assessment Specification*. A broad overview of the mandatory subject skills, knowledge and understanding that will be assessed in the Course is given in this section.

This includes:

- knowledge and understanding of a range of complex statistical concepts
- the ability to identify and use appropriate statistical models
- the ability to apply more advanced operational skills in statistical contexts
- the ability to use mathematical reasoning skills to extract and interpret information, think logically and solve problems
- the ability to communicate conclusions, exhibiting appreciation of their limitations
- the ability to think analytically about the consequences of methodological choices

Skills, knowledge and understanding to be included in the Course will be appropriate to the SCQF level of the Course. The SCQF level descriptors give further information on characteristics and expected performance at each SCQF level (www.sqa.org.uk/scqf).

Assessment

Information about assessment for the Course is included in the *Course Assessment Specification*, which provides full details including advice on how a learner's overall attainment for the Course will be determined.

Unit assessment

All Units are internally assessed against the requirements shown in the *Unit Specification.*

They can be assessed on a Unit-by-Unit basis or by combined assessment.

They will be assessed on a pass/fail basis within centres. SQA will provide rigorous external quality assurance, including external verification, to ensure assessment judgments are consistent and meet national standards.

The assessment of the Units in this Course will be as follows.

Data Analysis and Modelling (Advanced Higher)
Learners who complete the Unit will be able to:

- use statistical skills linked to data analysis and modelling

Statistical Inference (Advanced Higher)
Learners who complete the Unit will be able to:

- use statistical skills linked to statistical inference
- use skills linked to carrying out a statistical investigation

Hypothesis Testing (Advanced Higher)
Learners who complete the Unit will be able to:

- use statistical skills linked to hypothesis testing
- use skills linked to carrying out a statistical test

Exemplification of possible approaches to assessment for these Units is provided in the *National Assessment Resource.*

Course assessment

Courses from National 4 to Advanced Higher include assessment of added value[1]. At National 5, Higher and Advanced Higher, the added value will be assessed in the Course assessment. The added value for the Course must address the key purposes and aims of the Course, as defined in the Course rationale. It will do this by addressing one or more of breadth, challenge and application.

[1] Definitions can be found here: http://www.sqa.org.uk/sqa/58409.html

In the Advanced Higher Statistics Course, added value will focus on:

- breadth
- challenge
- application

Learners will draw on, extend and apply the skills they have learned during the Course. This will be assessed within a question paper[2], requiring demonstration of the knowledge, skills and understanding acquired from across the Units and how they can be applied in unfamiliar contexts and/or integrated ways.

[2] See link above for definitions.

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

It is expected that learners will develop broad, generic skills through this Course. The skills that learners will be expected to improve on and develop through the Course 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 Course 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 skills is given in SQA's *Skills Framework: Skills for Learning, Skills for Life and Skills for Work*. The level of these skills will be appropriate to the level of the Course. Further information on building in skills for learning, skills for life and skills for work for the Course is given in the *Course Support Notes*.

Administrative information

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History of changes to National Course Specification

Course details	Version	Description of change	Authorised by	Date

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