

Component Specification

Mathematics

NFQ Level 5

5N1833

1. Component Details

Title	Mathematics
Teideal as Gaeilge	Matamaitic
Award Class	Minor
Code	5N1833
Level	5
Credit Value	15
Purpose	The purpose of this award is to equip the learner with the relevant knowledge, skill and competence to apply a broad range of mathematical skills and tools to a wide variety of contexts, with some theoretical understanding.
Units	The Learning Outcomes are grouped into the following units: 1 MODELLING USING MATHEMATICS 2 STATISTICS AND PROBABILITY 3 FUNCTIONS AND GRAPHS 4 CALCULUS 5 COMPLEX NUMBERS 6 TRIGONOMETRY
Learning Outcomes	Learners will be able to: 1 MODELLING USING MATHEMATICS

- 1.1 Explain the concept of a mathematical model to include the difference between mathematical models and physical models
- 1.2 Explain the modeling process in diagrammatic form
- 1.3 Solve simple mathematical models to include identifying situations requiring mathematical modeling, and using appropriate mathematical skills and processes
- 1.4 Apply simple mathematical models to explain and predict behaviour

2 STATISTICS AND PROBABILITY

- 2.1 Discuss statistical concepts to include discrete and continuous variables, sampling, variance, skewness
- 2.2 Present information in a range of graphical and tabular forms, using pie charts, trend graphs, correlation diagrams (+/-), cumulative frequency curves, histograms and frequency tables with both discrete and continuous variables
- 2.3 Calculate the statistics for measuring and contrasting averages and dispersion of grouped data by calculating the mean, mode, median, weighted average, range, inter-quartile range and standard deviation
- 2.4 Calculate the number of possible outcomes on tests with no repetitions by using the Fundamental Principle of Counting, and Permutations and Combinations
- 2.5 Demonstrate an understanding of relative frequency and probability by using Information Technology simulations
- 2.6 Solve simple probability problems of one or two events including where two events are mutually exclusive and where two events are independent
- 2.7 Discuss findings, to include interpretation of results and distortions which may arise, and reasons for findings

3 FUNCTIONS AND GRAPHS

- 3.1 Describe the properties of basic mathematical functions to include linear, quadratic, exponential, log and trigonometric functions
- 3.2 Define the inverse of a function

- 3.3 Graph linear and quadratic functions showing the relationship between the domain and range
- 3.4 Derive the inverse of a function from its algebraic expression
- 3.5 Calculate the equation of a straight line using a range of formulae to include distance between two points, slope, parallel lines and perpendicular lines
- 3.6 Solve maximum and minimum problems with limitations given by linear inequalities from graphs of linear inequalities and half planes
- 3.7 Analyse graphs of linear and quadratic functions for important properties to include domain and range, maximum and minimum values, increasing and decreasing intervals, periodicity
- 4 CALCULUS
 - 4.1 Outline the key concepts of calculus to include limits, differentiation and integration
 - 4.2 Explain the fundamental theorem of calculus
 - 4.3 Calculate average rates of change for related variables x and y for a variety of standard functions $y=f(x)$
 - 4.4 Differentiate simple standard functions using a table of derivatives
 - 4.5 Use the Product Rule, Quotient Rule and Chain Rule to calculate the derivative of composite functions
 - 4.6 Integrate standard integrals, polynomials, trigonometric and exponential functions
 - 4.7 Calculate the area enclosed between a curve and the x -axis using integration
 - 4.8 Apply differentiation to solve simple rates of change models to include maximum and minimum
 - 4.9 Apply integration to solve simple practical real life problems
- 5 COMPLEX NUMBERS
 - 5.1 Explain what is meant by a complex number
 - 5.2 Represent complex numbers on the Argand diagram to include distinguishing between the modulus and the argument

- 5.3 Solve quadratic equations with complex roots
- 5.4 Perform mathematical functions on complex numbers including addition, subtraction, multiplication, division, conjugate, modulus, and plot on an Argand diagram
- 5.5 Apply de Moivre's Theorem to finding powers of Z and the cube root of 1
- 6 TRIGONOMETRY
- 6.1 Explore the uses of trigonometry in every day life.
- 6.2 Define sine, cosine and tangent functions as related to the unit circle
- 6.3 Solve practical, simple problems using appropriate trigonometric formulae and terminology, including the sine, cosine and tangent ratios for right angled triangles, area of triangle = $\frac{1}{2}ab \sin C$, Sine Rule, Cosine Rule
- 6.4 Analyse the functions $y = \sin x$, $y = \cos x$, $y = \tan x$ and $y = a \sin bx$ from plotted graphs by determining period, and amplitude.

Assessment

General Information

Details of FET assessment requirements are set out in [Assessment Guidelines for Providers](#).

All FET assessment is criterion referenced. Successful achievement of the award is based on learners attaining the required standards of knowledge, skill or competence.

The techniques set out below are considered the optimum approach to assessment for this component. In exceptional circumstances providers may identify alternative assessment techniques through the provider's application for programme validation which are **reliable** and **valid** but which are more appropriate to their context.

Assessment of a number of components may be integrated across programmes for delivery, provided that the learning outcomes of each minor award are assessed.

Group or team work may form part of the assessment, provided each learner's achievement is separately assessed.

All providers are required to submit an assessment plan as part of their application for programme validation. Assessment Plans will include information relating to scheduling and integration of

assessment. See current FET validation guidelines at www.qqi.ie.

Assessment Techniques

In order to demonstrate that they have reached the standards of knowledge, skill and competence identified in all the learning outcomes, learners are required to complete the assessment(s) below.

The assessor is responsible for devising assessment instruments (e.g. project and assignment briefs, examination papers), assessment criteria and mark sheets, consistent with the techniques identified below and FETAC's assessment requirements.

Programme validation will require providers to map each learning outcome to its associated assessment technique. See current FET validation guidelines at www.qqi.ie.

All learning outcomes **must** be assessed and achieved

Assignment	60%
Examination - Theory	40%

Description

Assignment

An assignment is an exercise carried out in response to a brief with specific guidelines as to what should be included. An assignment is usually of short duration and may be carried out over a specified period of time.

Examination - Theory

An examination provides a means of assessing a learner's ability to recall and apply knowledge, skills and understanding within a set period of time and under clearly specified conditions.

A theory-based examination assesses the ability to recall, apply and understand specific theory and knowledge.

Recognition of Prior Learning (RPL)

Learners may be assessed on the basis of their prior knowledge and experience. Providers must be specifically quality assured to assess learners by this means. To do so they must complete B10, see Provider's Quality Assurance Guidelines and be included on the Register of RPL approved providers. See RPL Guidelines at www.fetac.ie for further information and registration details.

Grading	Pass	50% - 64%
	Merit	65% - 79%
	Distinction	80% - 100%
Specific Validation Requirements	The provider must have all of the following in place to offer this award: Each candidate will be supplied with a set of Formulae and Tables at examination Calculators are available to each candidate at examination	
Supporting Documentation	None	
Access	To access programmes leading to this award the learner should have reached the standards of knowledge, skill and competence associated with the preceding level of the National Framework of Qualifications. This may have been achieved through a formal qualification or through relevant life and work experience.	
Transfer	Successful completion of this component award enables the learner to transfer to programmes leading to other certificates where this component is a mandatory or an elective requirement.	

2. FET Award Standards

QQI award standards are determined within the National Framework of Qualifications (NFQ), <http://www.nfq-qqi.com>. QQI determines standards for the education and training awards that it makes itself and that are made by providers to whom it has delegated authority to make an award. Providers offering programmes leading to QQI awards **must** have their programme(s) validated in accordance with current validation policy (see www.qqi.ie).

Award standards are designed to be consistent with the NFQ's award classes i.e. major, special purpose, supplemental and minor awards. They are expressed in terms of **learning outcomes** i.e. concise statements of what the learner is expected to know or be able to do in order to achieve a particular award. Learning outcomes for FET awards are contained within the associated specifications:

AWARD CLASS	STANDARDS	AWARDS
Major Award	Certificate Specification	Certificate (Levels 1 to 5) Advanced Certificate (Level 6)
Supplemental Award	Supplemental Specification	Supplemental Certificate (Level 3 to 6)
Special Purpose	Specific Purpose Specification	Specific Purpose Certificate (Levels 3 to 6)

Award standards are thresholds, they describe standards of knowledge, skill or competence to be acquired, and where appropriate, demonstrated, by a learner before an award may be made.

Award standards will be reviewed from time to time as necessary. Minor changes may be made by the QQI executive outside the review cycle where necessary. Changes to standards are published on QQI's website. Providers with validated programmes and providers with delegated authority to make awards are responsible for monitoring relevant standards and making necessary responses to changes.

3. FET Credit

Every FET certificate and component specification includes an FET credit value (Table 1). FET credit is quantified in multiples of 5 FET credits (up to 50 hours of learner effort). Learner effort is based on the time taken by typical learners at the level of the award to achieve the learning outcomes for the award. It includes all learning time involved including: guided learning hours, self-directed learning and assessment.

Table 1: FET Credit Values

NFQ Level	Major Awards Credit Values	Default Credit Values Minor Awards	Other Permitted Minor Award Credit Values	Special Purpose and Supplemental Award Credit Value Ranges
1	20	5	10	
2	30	5	10	
3	60	10	5,20	>5 and <60
4	90	10	5,15,20	>5 and <90
5	120	15	5,10,30	>5 and <120
6	120	15	5,10,30	>5 and <120

Guide to Level

Learning outcomes at this level include a broad range of skills that require some theoretical understanding. The outcomes may relate to engaging in a specific activity, with the capacity to use the instruments and techniques relating to an occupation. They are associated with work being undertaken independently, subject to general direction.

Strand	Sub-strand	Nature of learning
Knowledge	Breadth	Broad range of knowledge
	Kind	Some theoretical concepts and abstract thinking, with significant depth in some areas.
Know How & Skill	Range	Demonstrate a broad range of specialised skills and tools
	Selectivity	Evaluate and use information to plan and develop investigative strategies and to determine solutions to varied unfamiliar problems

Competence	Context	Act in a range of varied and specific contexts, taking responsibility for the nature and quality of outputs; identify and apply skill and knowledge to a wide variety of contexts
	Role	Exercise some initiative and independence in carrying out defined activities; join and function within multiple, complex and heterogeneous groups
	Learning to Learn	Learn to take responsibility for own learning within a managed environment
	Insight	Assume full responsibility for consistency of self- understanding and behaviour

Extract from 'Determinations for the Outline National Framework of Qualifications': NQAI