Dearbhú Cáilíochta agus Cáilíochtaí Éireann
Quality and Qualifications Ireland

Component Specification

Mathematics

NFQ Level 6

6N3395

1. Component Details

Title	Mathematics
Teideal as Gaeilge	Matamaitic
Award Class	Minor
Code	6N3395
Level	6
Credit Value	15
Purpose	The purpose of this award is to equip the learner with the knowledge, skill and competence to apply and transfer a broad range of mathematical theories and concepts to a wide variety of contexts.
Units	The Learning Outcomes are grouped into the following units: 1 Matrices 2 Sequences and Series 3 Set Theory and Logic 4 Vectors 5 Further Calculus and Series
Learning Outcomes	Learners will be able to: 1 Matrices 1.1 Describe the concept of a matrix and its application in linear algebra

1.2 Perform mathematical operations on 2*2 and 3*3 matrices including addition, subtraction, scalar multiplication and matrix multiplication

1.3 Calculate determinants of 2*2 and 3*3 matrices and inverses of 2*2 matrices

1.4 Solve simultaneous linear equations using matrices

1.5 Use matrices for 2D rotations, translations and reflections.

2 Sequences and Series

2.1 Describe sequences with recursive and formulaic definitions

2.2 Determine if a series is convergent, divergent or oscillating

2.3 Use formulae to calculate the sum of Arithmetic Series and Geometric Series

2.4 Use the Binomial Theorem to expand (1+x)n, (1-x)n, where neN

2.5 Calculate the first n terms of a Taylor expansion

2.6 Apply sequences and series to practical problems.

3 Set Theory and Logic

3.1 Explain the basic operations on sets including union, intersection, complement, symmetric difference, Cartesian product, and power of a set

3.2 Define the Boolean operations for sets

3.3 Use the language of set theory appropriately including universal set, subsets, sets N, Z, Q, R, C and ø, finite and infinite sets, and cardinal number of a set

3.4 Use Venn diagrams of two and three sets to represent relationships between sets

3.5 Construct a truth table

3.6 Construct a truth table for a compound statement involving AND, NOT, OR and XOR

3.7 Use truth tables to establish logical equivalence

3.8 Demonstrate De Morgan¿s Laws using truth tables.

4 Vectors

4.1	Define vectors using magnitude and direction
4.2	Perform mathematical operations on vectors graphically and in component form including addition, subtraction and multiplication by a scalar
4.3	Find the modulus of a vector
4.4	Find the dot or scalar product of vectors
4.5	Determine if two vectors are parallel or perpendicular
4.6	Find the angle between two vectors
4.7	Apply vectors to practical problems involving displacement, motion, velocity and acceleration.
5	Further Calculus and Series
5.1	Explain the application of differentiation & integration in solving a range of practical problems
5.2	Explain the consequences of the intermediate value theorem for continuous functions
5.3	Analyse a function from both algebraic and graphical perspectives to include extracting information relevant to the phenomenon modelled by the function
5.4	Interpret the derivative of a function at a point as the rate of change in the quantity modelled and as the slope of the tangent line including estimating its value from the graph of a function
5.5	Relate the value of the first and second derivative as measures of increase and decrease of a function
5.6	Solve simple differential equations using integration
5.7	Use integration to calculate the area between a curve and the x-axis, a curve and the y-axis and the area between two curves
5.8	Use the Maclaurin Series to expand a variety of simple functions
5.9	Apply differentiation and integration to solving practical problems.

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	40%
Examination - Theory	60%

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

There are no specific validation requirements

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.

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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)
Minor Award	Component Specification	Component Certificate (Levels 1 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 comprehensive range of skills which may be vocationally-specific and/or of a general supervisory nature, and require detailed theoretical understanding. The outcomes also provide for a particular focus on learning skills. The outcomes relate to working in a generally autonomous way to assume design and/or management and/or administrative responsibilities. Occupations at this level would include higher craft, junior technician and supervisor.

Strand	Sub-strand	Nature of learning
Knowledge	Breadth	Specialised knowledge of a broad area
	Kind	Some theoretical concepts and abstract thinking, with significant underpinning theory
Know How & Skill	Range	Demonstrate a comprehensive range of specialised skills and tools
	Selectivity	Formulate responses to well defined abstract problems
Competence	Context	Act in a range of varied and specific contexts involving creative and non-routine activities; transfer and apply theoretical concepts and/or technical or creative skills to a range of contexts
	Role	Exercise substantial personal autonomy and often take responsibility for the work of others and/or for the allocation of resources; form and function within, multiple and complex heterogeneous groups.
	Learning to Learn	Learn to evaluate own learning and identify needs within a structured learning environment; assist others in identifying learning needs
	Insight	Express an internalised, personal world view, reflecting engagement with others.

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