

# Unit Outline (Higher Education)

**Institute / School:** Institute of Education, Arts & Community

**Unit Title:** Introduction to Technical Maths

**Unit ID:** EDMTH1000

**Credit Points:** 15.00

**Prerequisite(s):** Nil

**Co-requisite(s):** Nil

**Exclusion(s):** (FASTP1203)

**ASCED:** 010101

## Description of the Unit:

On completion of this unit, students should have developed the mathematical understanding and tools needed to undertake further mathematical studies, including in an engineering discipline. Students will be able to demonstrate competency with basic technical mathematics; use functions involving powers, logarithms and exponents and trigonometric functions; manipulate a wide range of algebraic equations in order to substitute values and to transform to solve for a particular variable; solve systems of linear equations; perform basic operations on vectors and matrices; use geometric and trigonometric properties of angles and circles to solve problems; apply the basic concepts of differential and integral calculus and apply the above skills in context to solve technical and engineering problems.

**Grade Scheme:** Graded (HD, D, C, P, MF, F, XF)

## Work Experience:

No work experience

**Placement Component:** No

**Supplementary Assessment:** Yes

Where supplementary assessment is available a student must have failed overall in the Unit but gained a final mark of 45 per cent or above, has completed all major assessment tasks (including all sub-components where a task has multiple parts) as specified in the Unit Description and is not eligible for any other form of supplementary assessment.

**Course Level:**

Level of Unit in Course	AQF Level of Course					
	5	6	7	8	9	10
Introductory	<input type="checkbox"/>	<input type="checkbox"/>	✓	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Intermediate	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Advanced	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

### Learning Outcomes:

#### Knowledge:

- K1.** Demonstrate how basic mathematical functions can be used to solve technical and engineering problems,
- K2.** Identify, describe and explain the nature and properties of various mathematical functions and graphs,
- K3.** Explain the basic concepts of differential and integral calculus

#### Skills:

- S1.** Use mathematical software to manipulate, solve and graph various functions,
- S2.** Manipulate and transpose algebraic expressions accurately,
- S3.** Solve simultaneous equations analytically, graphically and by using matrices,
- S4.** Graph and analyse exponential, logarithmic and trigonometric functions for solutions,
- S5.** Perform basic operations on matrices and vectors,
- S6.** Add and resolve vectors,
- S7.** Use geometric and trigonometric properties of angles and circles to solve practical problems,
- S8.** Apply the basic concepts of differential and integral calculus

#### Application of knowledge and skills:

- A1.** Use mathematical techniques to model and analyse the physical world,
- A2.** Recognise the common principles in a variety of technical and engineering applications.

#### Unit Content:

The unit covers the following topics: Algebra, functions and graphs: Solving linear equations, inequations, algebraic fractions, substitution and transposition of formulae, solving simultaneous linear equations, index and logarithm laws, polynomial functions, quadratic functions, cubic and power functions - solving and sketching graphs. Matrices: Addition, subtraction and multiplication of matrices, Inverses and determinants for 2 by 2 matrices, matrix solutions to simultaneous equations, transformations in the plane - reflection, rotation and translation Vectors: definition, representations - matrix, coordinates and  $i, j$  system, addition and subtraction of vectors, multiplication by a scalar, resolving a vector in rectangular components, determining the magnitude of a vector, the unit vector. Functions and graphs: Exponential and logarithmic functions - sketch and interpret, applications of these functions, trigonometric functions, convert between degrees and radians, circular functions using the unit circle, sketch, applications of circular functions, solve problems using trigonometric identities and addition and double angle formulae. Calculus: average and instantaneous rates of change, gradient of a tangent at a point, first principles approach to derivatives, simple derivatives of polynomial functions, circular functions and exponentials, applications of differentiation including instantaneous rates of change, stationary values of functions, anti-derivatives of simple functions. Mechanics - statics of a particle: basic terminology and principles, using a triangle of forces to solving problems, resolving forces.

**Learning Task and Assessment:**

Learning Outcomes Assessed	Assessment Tasks	Assessment Type	Weighting
A1, A2	Formative quiz	Quiz	5-10%
K1, K2, K3, S1, S2, S3, S4, S5, S6, S7, S8, A1, A2	Two formative topic tests demonstrating aptitude for a subsection of the content.	Topic tests	30-40%
K1, K2, K3, S1, S2, S3, S4, S5, S6, S7, S8, A1, A2	Students complete a set of assigned questions demonstrating all working of the problem	Assignment	20-30%
K1, K2, K3, S1, S2, S3, S4, S5, S6, S7, S8, A1, A2	Two-hour examination covering all unit content, scientific calculator and two A4 2 sided sheets of notes allowed.	Exam	30-40%

**Adopted Reference Style:**

APA ( )

Refer to the [library website](#) for more information

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