



# Course Outline (Higher Education)

<b>School:</b>	School of Education
<b>Course Title:</b>	INTRODUCTION TO TECHNICAL MATHS
<b>Course ID:</b>	EDMTH1000
<b>Credit Points:</b>	15.00
<b>Prerequisite(s):</b>	Nil
<b>Co-requisite(s):</b>	Nil
<b>Exclusion(s):</b>	(FASTP1203)
<b>ASCED:</b>	010101

## Description of the Course:

On completion of this course, 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)

**Placement Component:** No

**Supplementary Assessment:** Yes

Where supplementary assessment is available a student must have failed overall in the course but gained a final mark of 45 per cent or above and submitted all major assessment tasks.

## Program Level:

Level of course in Program	AQF Level of Program					
	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.

**Course Content:**

The course 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.

**Values:**

**V1.** Appreciation of mathematics as a universal language and its value as a problem solving tool.

### Graduate Attributes

The Federation University FedUni graduate attributes (GA) are entrenched in the [Higher Education Graduate Attributes Policy](#) (LT1228). FedUni graduates develop these graduate attributes through their engagement in explicit learning and teaching and assessment tasks that are embedded in all FedUni programs. Graduate attribute attainment typically follows an incremental development process mapped through program progression. **One or more graduate attributes must be evident in the specified learning outcomes and assessment for each FedUni course, and all attributes must be directly assessed in each program**

Graduate attribute and descriptor		Development and acquisition of GAs in the course	
		Learning Outcomes (KSA)	Assessment task (AT#)
GA 1 Thinkers	Our graduates are curious, reflective and critical. Able to analyse the world in a way that generates valued insights, they are change makers seeking and creating new solutions.	K1-3, S1-8, A1-2, V1	AT1, AT2a, AT2b, AT3, AT4
GA 2 Innovators	Our graduates have ideas and are able to realise their dreams. They think and act creatively to achieve and inspire positive change.	S1, A1-2, V1	AT1, AT3
GA 3 Citizens	Our graduates engage in socially and culturally appropriate ways to advance individual, community and global well-being. They are socially and environmentally aware, acting ethically, equitably and compassionately.	V1	AT1, AT2a, AT2b, AT3, AT4
GA 4 Communicators	Our graduates create, exchange, impart and convey information, ideas, and concepts effectively. They are respectful, inclusive and empathetic towards their audience, and express thoughts, feelings and information in ways that help others to understand.	K1-3, S1-8, A1-2, V1	AT1, AT2a, AT2b, AT3, AT4
GA 5 Leaders	Our graduates display and promote positive behaviours, and aspire to make a difference. They act with integrity, are receptive to alternatives and foster sustainable and resilient practices.	K1-3, S1-8, A1-2, V1	AT1, AT2a, AT2b, AT3, AT4

### Learning Task and Assessment:

Learning Outcomes Assessed	Learning Tasks	Assessment Type	Weighting
A1, A2	Demonstrated engagement with weekly tutorial and case based group work activities	Participation	5-10%
K1, K2, K3, S1, S2, S3, S4, S5, S6, S7, S8, A1, A2	Two 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	10-20%
K1, K2, K3, S1, S2, S3, S4, S5, S6, S7, S8, A1, A2	Two-hour examination covering all course content, scientific calculator and single A4 2 sided sheet of notes allowed.	Exam	30-40%

### Adopted Reference Style:

APA

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

Fed Cite - [referencing tool](#)