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:

Not wholly work experience: Student is not undertaking work experience in industry or student is undertaking work experience in industry where learning and performance is directed by the provider.

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	☐	☐	✔	☐	☐	☐
Intermediate	☐	☐	☐	☐	☐	☐
Advanced	☐	☐	☐	☐	☐	☐

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,

Unit Outline (Higher Education)
EDMTH1000 INTRODUCTION TO TECHNICAL
MATHS

anti-derivatives of simple functions.
- Mechanics - statics of a particle: basic terminology and principles, using a triangle of forces to solving problems, resolving forces.

Graduate Attributes

The Federation University Federation 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 Courses. Graduate attribute attainment typically follows an incremental development process mapped through Course progression. **One or more graduate attributes must be evident in the specified learning outcomes and assessment for each FedUni Unit, and all attributes must be directly assessed in each Course**

Graduate attribute and descriptor		Development and acquisition of GAs in the Unit	
		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	Assessment 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 unit content, scientific calculator and single A4 2 sided sheet of notes allowed.	Exam	30-40%

Alignment to the Minimum Co-Operative Standards (MiCS)

The Minimum Co-Operative Standards (MiCS) are an integral part of the Co-Operative University Model. Seven criteria inform the MiCS alignment at a Course level. Although Units must undertake MiCS mapping, there is NO expectation that Units will meet all seven criteria. The criteria are as follows:

1. Co-design with industry and students
2. Co-develop with industry and students
3. Co-deliver with industry
4. FedTASK alignment
5. Workplace learning and career preparation
6. Authentic assessment
7. Industry-link/Industry facing experience

MiCS Course level reporting highlights how each Course embraces the principles and practices associated with the Co-Operative Model. Evidence of Course alignment with the MiCS, can be captured in the Course Modification Form.

MICS Mapping has been undertaken for this Unit   No

Date:

Adopted Reference Style:

APA

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

Fed Cite - [referencing tool](#)