

### Summary Information

Module Code	4500ICBTCE
Formal Module Title	Engineering Maths for Engineers
Owning School	Civil Engineering and Built Environment
Career	Undergraduate
Credits	15
Academic level	FHEQ Level 4
Grading Schema	40

### Teaching Responsibility

LJMU Schools involved in Delivery
LJMU Partner Taught

### Partner Teaching Institution

Institution Name
International College of Business and Technology

### Learning Methods

Learning Method Type	Hours
Lecture	36
Seminar	15
Tutorial	9

### Module Offering(s)

Display Name	Location	Start Month	Duration Number Duration Unit
APR-PAR	PAR	April	12 Weeks

JAN-PAR	PAR	January	12 Weeks
SEP-PAR	PAR	September	12 Weeks

## Aims and Outcomes

Aims	This unit will provide the analytical knowledge and techniques needed to carry out a range of engineering tasks and will provide a base for further study of engineering mathematics.
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**After completing the module the student should be able to:**

### Learning Outcomes

Code	Number	Description
MLO1	1	Identify the use of basic algebraic manipulations and mathematical functions in the solution of engineering problems and apply trigonometric methods to solve engineering problems.
MLO2	2	Demonstrate the knowledge of calculus and apply techniques in differentiation and integration to the solution of engineering problems.
MLO3	3	Demonstrate the knowledge statistics and probability and apply to solve engineering problems.
MLO4	4	Use and apply mathematical software to the solution of engineering mathematics problems such as Mini Tab, excel etc;

## Module Content

Outline Syllabus	<p>Algebraic methods: Substitution, simplification, factorization, indices, evaluation and transposition of formulae, fractions and partial fractions. Linear and quadratic equations, linear simultaneous equations. Functions: Notation, types of function, composite and inverse, graphs. polynomial division, quotients and remainders, use of factor and remainder theorem, rules of order for partial fractions (including linear, repeated and quadratic factors), reduction of algebraic fractions to partial fractions. Revision of elementary coordinate geometry: Distance between two points, the straight line, simple polynomial curves. Cartesian and polar co-ordinate systems, properties of the circle. Arithmetic and geometric: notation for sequences, arithmetic and geometric progressions, the limit of a sequence, sigma notation, the sum of a series, arithmetic and geometric series, Pascal's triangle and the binomial theorem. Trigonometric :Introduction, Trigonometric ratios of acute angles, evaluating trigonometric ratios, solution of right angled triangles, Angles of elevation and depression, sine and cosine rules, area of any triangle, solving engineering applications. Calculus: the concept of the limit and continuity, definition of the derivative, derivatives of standard functions, notion of the derivative and rates of change, differentiation of functions using the product, quotient and function of a function rules, integral calculus as the calculation of area and the inverse of differentiation, the indefinite integral and the constant of integration, standard integrals and the application of algebraic and trigonometric functions for their solution, the definite integral and area under curves. Further differentiation: second order and higher derivatives, logarithmic differentiation, differentiation of inverse trigonometric functions, differential coefficients of inverse hyperbolic functions. Further integration: integration by parts, integration by substitution, integration using partial fractions. Applications of the calculus: e.g. maxima and minima, points of inflexion, rates of change of temperature, distance and time, electrical capacitance, rms values, electrical circuit analysis, AC theory, electromagnetic fields, velocity and acceleration problems, complex stress and strain, engineering structures, simple harmonic motion, centroids, volumes of solids of revolution, second moments of area, moments of inertia, rules of Pappas, radius of gyration, thermodynamic work and heat energy. Tabular and graphical form: data collection methods, histograms, bar charts, line diagrams, cumulative frequency diagrams, scatter plots. Central tendency and dispersion: the concept of central tendency and variance measurement, mean, median, mode, standard deviation, variance and interquartile range, application to engineering production. Regression, linear correlation: determine linear correlation coefficients and regression lines and apply linear regression and product moment correlation to a variety of engineering situations. Probability: Introduction, Laws of probability, engineering applications of probability.</p>
Module Overview	
Additional Information	

## Assessments

Assignment Category	Assessment Name	Weight	Exam/Test Length (hours)	Module Learning Outcome Mapping
Report	Analytical Report (1500 words)	30	0	MLO1, MLO2
Exam	Written Examination	70	2	MLO3, MLO4

## Module Contacts

### Module Leader

Contact Name	Applies to all offerings	Offerings
Karl Jones	Yes	N/A

### Partner Module Team

Contact Name	Applies to all offerings	Offerings
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