

Summary Information

Module Code	4500ICBTEG
Formal Module Title	Engineering Mathematics
Owning School	Engineering
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	45
Tutorial	15

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_NS-PAR	PAR	September (Non-standard start date)	12 Weeks
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Aims and Outcomes

Aims	This module 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	Apply the principles of differential equations and partial differentiation to solve problems in Engineering.
MLO2	2	Evaluate Grad, Div, Curl, line integrals and double integrals.
MLO3	3	Evaluate simple Laplace transforms and their inverses using tables with application to initial value problems.
MLO4	4	Demonstrate the knowledge of differential equations and mathematical modelling of physical systems and simulation using MATLAB and Simulink.

Module Content

Outline Syllabus	Basic algebra: transposition, simplification, quadratic equations, simultaneous equations. Basic trigonometry: functions sin, cos, tan, inverses, sec, cosec, cot; identities, $R\sin(x+a)$. Basic calculus: Derivative as slope and rate of change, standard derivatives; product, quotient and function of a function rules; integration as reverse of differentiation, standard integrals, area under a curve; differential equations and solution by direct integration. Complex numbers: addition, subtraction, multiplication, complex conjugate and division in algebraic form. The Argand diagram. Polar form and exponential form, with multiplication and division. De Moivre's theorem (powers and roots). Locus problems. Calculus: Implicit, parametric and logarithmic differentiation. Maxima and minima. McLaurin's series. Partial differentiation, first order change, analysis of errors, method of least squares. Integration techniques (substitution, partial fractions, by parts) and simple applications of integration. Matrices and Determinants: second and third order determinants, evaluation, properties, Cramer's Rule for solution of simultaneous equations; matrices, addition, subtraction, multiplication, transpose, inverse (via adjoint), solution of simultaneous linear equations by matrix inversion. Vectors: sum, difference, magnitude, components, Cartesian representation in three dimensions; scalar and vector products, application to simple geometrical and physical problems. Differential Equations: solution of first order by separation of variables and integrating factor; second order with constant coefficients, auxiliary equation, complementary function, particular integral by substitution (including snag case), application to, for example, mass-spring-damper and / or L-C-R circuits.
Module Overview	
Additional Information	

Assessments

Assignment Category	Assessment Name	Weight	Exam/Test Length (hours)	Module Learning Outcome Mapping
Exam	Exam	70	2	MLO2, MLO3

Report	Essay	30	0	MLO1, MLO4
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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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