

MATH H1632: Mathematics

Module Title:			Mathematics					
Language of Instruction:		n:	English					
Credits:		10						
NFQ Level: 7		7						
Module Delivered In			No Programmes					
Teaching & Learning Strategies:			A series of lectures will be delivered using whiteboard and data projector. The Institute Managed Learning Environment will be used to interactively communicate with students e.g. on-line test, discussion forums, reference information. Mathematical software (e.g. Matlab) will be used by students to reinforce the mathematical principles and practices.					
Module Aim:			To give the students the understanding, competencies and skills necessary to support the mathematical procedures encountered in the other modules of this programme.					
Learning Outcomes								
On successful completion of this module the learner should be able to:								
LO1	Manipulate	anipulate algebraic and complex number expressions and transpose formulae, including those containing logarithms.						
LO2	Perform operations on matrices and solve linear, quadratic and logarithmic equations.							
LO3	Plot and interpret graphs of basic functions, sinusoidal, logarithmic, exponential and hyperbolic functions.							
LO4	Apply theo	orems	in geometry to engineering applications.					
LO5	Apply calculus to the solution of engineering type problems.							
Pre-requisite learning								
Module Recommendations This is prior learning (or a practical skill) that is recommended before enrolment in this module.								
No recommendations listed								
Incompatible Modules These are modules which have learning outcomes that are too similar to the learning outcomes of this module.								
No incompatible modules listed								
Co-requisite	Modules							
No Co-requisite modules listed								
Requirements This is prior learning (or a practical skill) that is mandatory before enrolment in this module is allowed.								
No requirements listed								



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Module Content & Assessment

Indicative Content

Numerical Calculation

(i) rules of precedence (ii) D.A.L calculator (iii) rules of indices (iv) exponential format (v) units and prefixes (vi) LCM and the HCF of whole numbers (vii) unitary method problems (viii) percentages (ix) average of a set of numbers (x) Conversion between number systems.

Basic Algebra

(i) Addition, subtraction and multiplication of algebraic expressions (ii) Factorisation of algebraic expressions (iii) Solution of simple equations, simultaneous and quadratic equations (iv) Transposition of formulae (v) Transposition of formulae to solve mensuration problems (vi) Log laws and log equations.

Graphs

(i) Interpretation of plotted graphs (ii) Properties of straight line and quadratic graphs (iii) Cubic graphs (iv) Plotting graphs of the form .

Trigonometry and Waveforms

(i) Surd form for the trigonometric ratios sine, tangent and cosine for angles 60o, 30o and 45o. (iii) Right angled triangles, Pythagoras' theorem, trigonometric ratios sine, tangent and cosine and the inverse trigonometric functions sin-1x, tan-1x and cos-1x (iv) Degree and radian measure (v) Sine and cosine rules in the solution of non-right angled triangles (vi) Trigonometric ratios secant, cosecant and cotangent (vii) Verification of trigonometric identities involving all six trigonometric ratios, compound angle formulae and sums and products of sines and cosines. (viii) Graphs of waves, wave theory and its applications to electrical principles (ix) Rewriting of addition of sine and cosine functions as cosine functions and applications of this in electrical principles and mechanics.

Geometry

Supplementary, complementary, opposite, corresponding and alternate angles. Equilateral, equiangular, isosceles and scalene triangles; Basic geometry theorems related to angles of triangles, isosceles triangles, congruent triangles, quadrilaterals, parallelograms and angles with circles.

Logarithmic, Exponential and Hyperbolic Functions

Exponential function. Application of the exponential function to engineering problems. Logarithmic function. Application of the logarithmic function to engineering problems. Application of logarithms to experimental data. Graphs of hyperbolic functions. Engineering applications of hyperbolic functions.

Differentiation

Derivative in terms of the limit of a function. Derivatives of common engineering functions and apply rules of differentiation. 2nd order derivatives and application to engineering problems. Second derivative test to find maxima, minima and points of inflexion and applications in engineering and kinematics.

Integration

Concept of indefinite integration and find indefinite integrals. Integration using substitution. Evaluation of definite integrals. Integration by parts formula. Integration using partial fractions. Use of integration to find areas under a graph, mean and root mean square values of functions. Use of integration to find the displacement and velocity of a particle. Apply integration to thermodynamics and structural mechanics problems.

Complex Numbers

General arithmetic operations on complex numbers. Graphical representation of complex numbers. Multiplication and division in polar form. Various representations of complex numbers such as rectangular and polar form. Finding and plotting roots of complex numbers. Powers of complex numbers. Complex number in exponential form. Applications of complex numbers in electrical principles.

Matrices

General arithmetic operations on matrices. Solution of equations by using the matrix inverse method and application to engineering problems. Various types of solutions of linear equations such as no solution, unique solution and infinite number of solutions. Applications of matrices in electrical principles and mechanics.

Assessment Breakdown	%
Continuous Assessment	30.00%
End of Module Formal Examination	70.00%

Continuous Assessment Assessment Type Assessment Description Outcome addressed % of total Assessment Date Examination n/a 3 30.00 Week 12

No Project

No Practical

End of Module Formal Examination									
Assessment Type	Assessment Description	Outcome addressed	% of total	Assessment Date					
Formal Exam	n/a	1,2,3,4,5	70.00	End-of-Semester					

SETU Carlow Campus reserves the right to alter the nature and timings of assessment



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Module Workload Workload: Full Time Workload Type Frequency Lecture Every Independent Learning Every Every Every Total Hours 6.00