MATH C3501: Engineering Mathematics III

Module Title:	Engineering Mathematics III
Language of Instruction:	English

Credits:	5

NFQ Level:	8

Module Delivered In	1 programme(s)

Teaching & Learning Strategies:	Lectures, practicals, private study

Module Aim:	The aim of this module is to develop students' understanding of differential equations and the application of these equations to civil engineering systems.

Learning Outcomes	
On successful completion of this module the learner should be able to:	
LO1	Solve more complicated first and second order ordinary differential equations.
LO2	Formulate and solve certain types of initial value and boundary value problems encountered in a civil engineering context.
LO3	Understand the application of partial differential equations to certain engineering applications.
LO4	Use a variety of numerical techniques for solving differential equations.

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
Further ordinary differential equations (a) Review of first order separable and homogeneous first order ODEs. (b) Linear first order ODEs. (c) Review of linear second order ODEs with constant coefficients. (d) More complicated forms of non-homogeneous linear second order linear ODEs. (e) Initial value and boundary value problems. (f) Systems of linear first order ODEs.
Applications of ordinary differential equations (a) Formulation of simple first order initial value problems. (b) Application of second order ODEs to free and forced vibrations, resonance and damping.
Introduction to partial differential equations (a) Introduction to formulation of the 1-D and 2-D heat conduction equation, diffusion equation and Laplace's equation. (b) Introduction to common solutions for these PDEs.
Numerical methods for solving differential equations (a) Euler's first order method. (b) Higher order methods including Range-Kutta. (c) Introduction to finite difference and finite element methods.

Assessment Breakdown	%
Continuous Assessment	100.00%

Continuous Assessment

Assessment Type	*Assessment Description*	*Outcome addressed*	*% of total*	*Assessment Date*
Examination	Class test 1	1,2,4	40.00	Week 8
Examination	Class test 2	1,2,3,4	30.00	Week 13
Short Answer Questions	quiz questions	1,2,3	20.00	Ongoing
Practical/Skills Evaluation	Computer practical tasks	4	10.00	Ongoing

No Project

No Practical

No End of Module Formal Examination

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*	*Average Weekly Learner Workload*
Lecture	12 Weeks per Stage	3.00
Estimated Learner Hours	15 Weeks per Stage	6.00
	Total Hours	126.00

Module Delivered In

Programme Code	Programme	Semester	Delivery
CW_CMHCE_B	Bachelor of Engineering (Honours) in Civil Engineering	5	Mandatory