Title:	Maths for Civil Engineering APPROVED
Long Title:	Mathematics for Civil Engineering

Module Code:	MATH7021	**Duration:**	1 Semester

Credits:	5
NFQ Level:	Intermediate
Field of Study:	Mathematics
Valid From:	Semester 1 - 2019/20 (September 2019)
Module Delivered in	2 programme(s)
Module Coordinator:	David Goulding
Module Author:	Jeremiah McCarthy
Module Description:	This module covers: linear systems; the methods of undetermined coefficients, and Laplace transforms, for the solution of linear differential equations; multiple integrals.

Learning Outcomes	
On successful completion of this module the learner will be able to:	
LO1	Formulate and solve linear systems using matrix methods.
LO2	Use both the methods of undetermined coefficients and of Laplace transforms to solve differential equations.
LO3	Solve systems of differential equations.
LO4	Evaluate double and triple integrals.

Pre-requisite learning
Incompatible Modules *These are modules which have learning outcomes that are too similar to the learning outcomes of this module. You may not earn additional credit for the same learning and therefore you may not enrol in this module if you have successfully completed any modules in the incompatible list.*
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. You may not enrol on this module if you have not acquired the learning specified in this section.*
No requirements listed
Co-requisites
No Co Requisites listed

Module Content & Assessment

Indicative Content
Linear Systems Linear systems including those arising from truss systems and network flows. Gaussian Elimination. Partial Pivoting. The Jacobi Method for solving heat distribution problems.
Differential Equations Solution of second order linear differential equations using the method of undetermined coefficients. Laplace transforms. The inverse Laplace transform via table look-up and partial fraction expansions. Solution of first and second order differential equations. Solution of 2x2 systems of linear differential equations.
Multiple Integrals Development and evaluation of double integrals over rectangular and circular regions. Applications to include mass of a non-homogeneous solid, centroids, and second moment of area about an axis. Development and evaluation of triple integrals over boxes and cylinders.

Assessment Breakdown	%
Course Work	30.00%
End of Module Formal Examination	70.00%

Course Work

Assessment Type	*Assessment Description*	*Outcome addressed*	*% of total*	*Assessment Date*
Written Report	Short report utilising software such as Microsoft Excel to assist in applying Gaussian elimination to linear systems. To include truss systems.	1	15.0	Week 5
Written Report	Short written project investigating various differential equations.	2	15.0	Week 10

End of Module Formal Examination

Assessment Type	*Assessment Description*	*Outcome addressed*	*% of total*	*Assessment Date*
Formal Exam	End-of-Semester Final Examination	1,2,3,4	70.0	End-of-Semester

Reassessment Requirement

Repeat examination
Reassessment of this module will consist of a repeat examination. It is possible that there will also be a requirement to be reassessed in a coursework element.

The institute reserves the right to alter the nature and timings of assessment

Module Workload

Workload: Full Time				
Workload Type	*Workload Description*	*Hours*	*Frequency*	*Average Weekly Learner Workload*
Lecture	Delivery of syllabus material	3.0	Every Week	3.00
Tutorial	Based on exercises	1.0	Every Week	1.00
Independent & Directed Learning (Non-contact)	Review of lecture material, completion of exercises	3.0	Every Week	3.00
			Total Hours	7.00
			Total Weekly Learner Workload	7.00
			Total Weekly Contact Hours	4.00

Workload: Part Time				
Workload Type	*Workload Description*	*Hours*	*Frequency*	*Average Weekly Learner Workload*
Lecture	Lecture	2.0	Every Week	2.00
Tutorial	Based on exercises	2.0	Every Second Week	1.00
Independent & Directed Learning (Non-contact)	No Description	4.0	Every Week	4.00
			Total Hours	8.00
			Total Weekly Learner Workload	7.00
			Total Weekly Contact Hours	3.00

Module Resources

Recommended Book Resources

- **K A Stroud, Dexter J Booth 2013, *Advanced Engineering Mathematics*, 7th Ed., Palgrave Macmillan Hampshire [ISBN: 9781137031204]**

Supplementary Book Resources

- **Dennis G. Zill, Warren S. Wright, Michael R. Cullen 2011, *Advanced Engineering Mathematics*, 4th Ed., Jones and Bartlett Sudbury, Mass [ISBN: 9780763779665]**
- **Steven C. Chapra, Raymond P. Canale 2010, *Numerical Methods for Engineers*, 6th Ed., McGraw-Hill Higher Education Boston [ISBN: 9780071267595]**

This module does not have any article/paper resources

This module does not have any other resources

Module Delivered in

Programme Code	Programme	Semester	Delivery
CR_CCIVL_7	Bachelor of Engineering in Civil Engineering	6	Elective
CR_CENVI_7	Bachelor of Engineering in Environmental Engineering	6	Elective