



Title:	Maths for Electrical Eng	APPROVED
Long Title:	Mathematics for Electrical Engineering	
Module Code:	MATH7022	
Credits:	5	
NFQ Level:	Intermediate	
Field of Study:	Mathematics	
Valid From:	Semester 1 - 2012/13 ( September 2012 )	
Module Delivered in	<a href="#">2 programme(s)</a>	
Module Coordinator:	AINE NI SHE	
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Module Description:	This module covers Laplace transforms, Fourier series and statistical inference.	
Learning Outcomes		
On successful completion of this module the learner will be able to:		
LO1	Find the Laplace transform of functions relevant to electrical engineering problems.	
LO2	Use the method of Laplace transforms to solve first and second order linear differential equations with constant coefficients and specified initial conditions and subject to inputs relevant to electrical engineering.	
LO3	Find the trigonometric form of the Fourier series representations of the most common periodic waveforms encountered in electrical engineering.	
LO4	Use sampling theory to determine confidence interval estimates of population means. Carry out an hypothesis test.	
LO5	Use the mathematical software package Maple as a computational tool and illustrative aid in work associated with the content of this module.	
Pre-requisite learning		
Module Recommendations		
This is prior learning (or a practical skill) that is strongly recommended before enrolment in this module. You may enrol in this module if you have not acquired the recommended learning but you will have considerable difficulty in passing (i.e. achieving the learning outcomes of) the module. While the prior learning is expressed as named CIT module(s) it also allows for learning (in another module or modules) which is equivalent to the learning specified in the named module(s).		
7158	MATH6043	Technological Mathematics 221
7796	MATH6042	Technological Mathematics 220A
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**

**Laplace Transforms**

Definition and notation. Construction of a short table of transforms. Discussion of some of the properties of the transform such as Linearity, the First Shift Theorem and the Derivative property. Determination of inverse transforms via table look-up and partial fraction expansions. The solution of ordinary differential equations with constant coefficients and specified initial conditions subject to the various inputs which arise in electrical engineering problems.

**Fourier Series**

The trigonometric form of the Fourier series representation of periodic signals such as the square wave, sawtooth waveform and the triangular waveform. Simplification of the formulae for Fourier coefficients for even and odd functions. Discrete frequency spectra – amplitude and phase spectra.

**Statistical Inference**

Review of prerequisites from probability theory including the Normal distribution. Discussion of the distribution of the sample mean via the Central Limit theorem. Confidence intervals for population means. Hypothesis tests – null hypothesis, alternative hypothesis. One-tailed and two-tailed tests.

**Maple for Electrical Engineering**

Introduction to the Maple software package. Use of the package to implement a wide variety of the mathematical functions and techniques used in engineering. Application of Maple packages dealing with Laplace transforms and differential equations.

Assessment Breakdown	%
Course Work	40.00%
End of Module Formal Examination	60.00%

**Course Work**

Assessment Type	Assessment Description	Outcome addressed	% of total	Assessment Date
Other	In Class Test	1,2	15.0	Week 5
Other	In Class Test	3	15.0	Week 9
Practical/Skills Evaluation	Maple Assessment	5	10.0	Week 12

**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	60.0	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**

<i>Workload Type</i>	<i>Workload Description</i>	<i>Hours</i>	<i>Frequency</i>	<i>Average Weekly Learner Workload</i>
Lecture	Lectures	3.0	Every Week	3.00
Independent & Directed Learning (Non-contact)	Revision of material covered in lectures, exercise sheets	3.0	Every Week	3.00
Lab	Maple Lab	1.0	Every Second Week	0.50
Tutorial	Tutorial	1.0	Every Second Week	0.50
Total Hours				8.00
Total Weekly Learner Workload				7.00
Total Weekly Contact Hours				4.00

**This module has no Part Time workload.**

Module Resources
<i>Recommended Book Resources</i>
<ul style="list-style-type: none"> <li>• G. James ISBN 2003, <i>Advanced Modern Engineering Mathematics</i>, 3rd Ed., Prentice Hall [ISBN: 0-130-45425-7]</li> <li>• A.Croft, R.Davison and M.Hargreaves 2000, <i>Engineering Mathematics: A Foundation for Electronic, Electrical, Communications and Systems Engineers</i>, 3rd Ed., Addison-Wesley [ISBN: 0-130-26858-5]</li> </ul>
<i>Supplementary Book Resources</i>
<ul style="list-style-type: none"> <li>• K.A. Stroud and D.J. Booth 2003, <i>Advanced Engineering Mathematics</i>, 4th Ed., Palgrave Macmillan [ISBN: 1-403-90312-3]</li> <li>• D.W.Jordan and P.Smith 2002, <i>Mathematical Techniques (3rd ed)</i>, OUP [ISBN: 0-199-24972-5]</li> </ul>
<i>This module does not have any article/paper resources</i>
<i>Other Resources</i>
<ul style="list-style-type: none"> <li>• Website: <i>Math Software for Engineers, Educators and Students</i> , Maplesoft <a href="http://www.mapleapps.com">http://www.mapleapps.com</a></li> <li>• Website: Eric Weisstein <i>MathWorld</i>, Wolfram <a href="http://mathworld.wolfram.com">http://mathworld.wolfram.com</a></li> </ul>

Module Delivered in			
Programme Code	Programme	Semester	Delivery
CR_EEPSY_8	<a href="#"><u>Bachelor of Engineering (Honours) in Electrical Engineering</u></a>	5	Mandatory
CR_EELEC_7	<a href="#"><u>Bachelor of Engineering in Electrical Engineering</u></a>	5	Mandatory