UNIVERSITY OF PLYMOUTH MODULE RECORD

MODULE CODE: MATH183	**CREDITS:** 20	**LEVEL:** I

MODULE TITLE:
ENGINEERING MATHEMATICS

PRE-REQUISITE(S): -none

CO-REQUISITE(S): -none

IF LINKED, MODULE LINKED TO:N/A

SHORT MODULE DESCRIPTOR (For module catalogue. **MAXIMUM four lines 9pt print)**:
This module provides students with a number of fundamental mathematical skills and techniques which are essential for the analysis of engineering problems.

ELEMENTS OF ASSESSMENT
COURSEWORK 50% EXAMINATION 50% END MODULE TEST % PRACTICE %

MODULE AIMS:
1. To ensure that all students reach a common level of competence in basic mathematical skills.
2. To provide a sound foundation of mathematical techniques necessary for the analysis of engineering problems.
3. To encourage students to use computer algebra packages to solve engineering problems.

LEARNING OUTCOMES: At the end of this module students **should be able to:**
1. Use basic mathematical techniques to solve engineering problems.
2. Calculate the derivative and integral of various mathematical functions.
3. Solve first and second order ordinary differential equations.
4. Understand matrix algebra, complex number theory and vector theory.
5. Use a computer algebra package to solve engineering problems.

ASSESSED SKILLS ELEMENTS:
Analysis and Evaluation: LO1, LO2, LO3, LO4.
I.T.: LO5.

INDICATIVE SYLLABUS CONTENT:
Fundamentals: Numbers and inequalities, logarithms and indices, quadratic equations and factorisation, algebraic and trigonometric manipulation.
Computer Packages: Introduction to self-learning and computer algebra packages such as Mathwise, Derive, Maple.
Differentiation: Differentiation from first principles. Sum, product, quotient and chain rule. Implicit and parametric differentiation. Higher order derivatives. Applications to rates of change, maxima and minima.
Integration: Use of standard integral tables. Definite integral. Interpretation as an area. Methods and applications.
Complex Numbers: Algebra of complex numbers. Argand diagram and polar form. De Moivre's theorem.
Vectors: Scalars and vectors. Algebra of vectors including scalar and vector products and their physical and geometrical interpretation.
Differential Equations: Solution of first order equations by separation of variables and integrating factor. Second order, constant coefficient, homogeneous and non-homogeneous equations. Application to LRC circuits and mass-spring-damper systems.
Matrices and Determinants: Matrix notation for linear equations. Algebra of matrices. Determinants. Inverse matrix. Solutions of systems of linear equations using matrices.

Recommended Reading:
A Croft and R Davison, “Mathematics for Engineers", Addison-Wesley, 1999.
G James, "Modern Engineering Mathematics", Prentice Hall, 3rd Ed., 2001.
K A Stroud, "Engineering Mathematics", Palgrave Macmillan, 5th Ed., 2001.

VALIDATION	DATE OF APPROVAL:	DATE OF IMPLEMENTATION
	DATE(S) OF APPROVED CHANGE:	

FACULTY: Technology	**DEPT:** Mathematics & Statistics	**PARTNER INSTITUTION:**
MODULE LEADER: Dr J.M. Davies		Terms: Autumn and Spring