MODULE **DESCRIPTOR**

MODULE TITLE	FUNCTIONS, VECTORS AND CALCULUS		
MODULE CODE	MA1831 (L4)	**CREDIT VALUE**	20 CREDITS (10 ECTS)
CAMPUS	UCLAN CYPRUS		
SCHOOL	SCHOOL OF SCIENCE		

MODULE **AIMS**

This module aims to:

1) Develop students' skills in the use of the techniques of calculus, complex numbers and vector algebra.
2) Give students confidence in developing their own mathematical skills.

MODULE **CONTENT**

Revision of Calculus
Differentiation: Rules for sum, difference, product and quotient; Function of a function; Standard derivatives; Parametric and implicit equations; Higher derivatives; Maxima and Minima
Integration: Appreciation of the techniques of integration by substitution, parts and partial fractions. Applications to area and volumes.

Functions
Basic properties of circular, exponential and hyperbolic functions and their inverses. Parametric representation of functions.

Power Series
Intuitive idea of a convergent infinite series. Taylor-Maclaurin series. Series for the standard functions. Binomial theorem. Approximation.

Complex Numbers
Definition, sum, difference, product and quotient. Argand diagram. Polar form; products and quotients in polar form. De Moivre's theorem. Elementary complex functions and Euler's Formula. Roots of equations.

Partial Differentiation
Functions of two or more variables. Partial derivatives. Taylor series for functions of two variables. Total differential. Application to errors and small changes. Change of variables, the chain rule. Stationary points of functions of two variables, local maxima, minima and saddle points.

Vectors
Vectors and scalars; laws of vector algebra. Unit vectors, components of a vector. Scalar and vector products; vector equations of lines and planes as applications. Triple vector products and their geometrical significance. Intro to vector calculus: grad, div and curl.

Multiple Integrals
Definitions and evaluation of double and triple integrals. Use of plane polar, spherical polar and cylindrical polar co-ordinate systems. Applications to areas, volumes, centres of mass etc.

INTENDED **LEARNING OUTCOMES**

On successful completion of this module a student will be able to:	
1.	Use mathematical methods of calculus and vector algebra to solve problems in applied mathematics.
2.	Use mathematics to describe a physical situation.
3.	Recognise the limitations of particular mathematical techniques.
4.	Apply the concept of complex numbers and the arithmetic operations involving them.
5.	Manage their own learning by making use of appropriate texts and learning materials.

TEACHING **METHODS**

The module will be delivered on campus, with weekly lecture/tutorial sessions. The class contact will consist of lectures together with tutorials. Lectures will introduce the theory and provide examples of its application. Key elements of the learning strategy are regular worksheets in which students are encouraged to practise their mathematical techniques. These will be discussed in the tutorials.

To facilitate and monitor the formative learning process a portfolio of formative test questions will be set, with diagnosis of any deficiencies students may have in their learning and skills development being fed back during tutorials. Summative assessment is by closed-book examination.exam conditions.

ASSESSMENT **METHODS**

The module is assessed through a Portfolio of 10 assessed questions and an examination.