

MODULE DESCRIPTOR

MODULE TITLE	COMPUTATIONAL MATHEMATICS		
MODULE CODE	MA1851 (L4)	CREDIT VALUE	20 CREDITS (10 ECTS)
CAMPUS	UCLAN CYPRUS		
SCHOOL	SCHOOL OF SCIENCE		

MODULE AIMS

The aims of this module are:

- 1) To develop student's skills of using a computer algebra package and to apply it to topics seen in 1st year mathematics.
- 2) To develop student's mathematical modelling skills and enable the student to apply their subject knowledge.
- 3) To develop student's transferrable skills; including report writing and communication.
- 4) To introduce students to the mathematical typesetting package, LaTeX.

MODULE CONTENT

Computational Mathematics

Students will use a computer algebra package for numerical calculations, using built in functions and constants, basic algebraic operations, naming and evaluating expressions, defining and evaluating functions, and plotting graphs (including Cartesian, polar and parametric plots and contours in 2D and 3D). Students will also be taught how to implement key concepts from other level-four modules.

The module will also introduce the student to programming, using the package's programming language. Key concepts include: the basic structure of a procedure, including input, output and local variables, programming structures including if statements and while loops, and the associated Boolean algebra, error handling, debugging and commenting procedures.

Mathematical Modelling

The process of modelling, including modelling change with difference equations, approximating change with difference equations and obtaining solutions to dynamical systems.

Transferable skills

Writing formal reports, writing reports in LaTeX using sectioning, paragraphs, lists, different font styles, mathematics, references, and including figures. Writing and delivering a presentation. Group working and group dynamics.

INTENDED LEARNING OUTCOMES

On successful completion of this module a student will be able to:	
1.	Use a computer algebra package to tackle mathematical problems.
2.	Demonstrate computer programming skills.
3.	Develop an appropriate mathematical model for a given problem, appreciate its strengths and weaknesses, and use IT to investigate the problem and produce a written report.
4.	Effectively contribute as a participant in a group activity.
5.	Demonstrate effective communication skills in an oral viva.

TEACHING METHODS

This module contains two distinct but highly complementary parts. In the first semester the student learns a computer algebra package such as Maple. This is taught in computer room sessions. A short introduction to the week's material will be given followed by students working from notes and problem sheets to give them practical experience of the package. This part will be assessed using a portfolio of problem sheet questions.

In the second semester, students will use the skills developed in the first semester to investigate practical mathematical problems. There will be some practice investigations which will teach the underlying principles of mathematical modelling and investigation. A final group investigation will be assessed via a formal report and a viva. There will be lectures where students are taught the principles of modelling and transferable skills, including report writing, group work and presentation giving. This will be complemented with computer room sessions where students will use the computer algebra package to work on their investigations.

For the practical sessions in both semesters, lab assistance will be given by the module tutor and demonstrators, where appropriate.

ASSESSMENT METHODS

The module is assessed through a Portfolio of selected questions from computing worksheets and a Modelling Project (written report and viva).