UNIVERSITY of NICOSIA

Course Code	Course Title	ECTS Credits
MATH-140	Mathematics with Computers	8
Department	**Semester**	**Prerequisites**
Mathematics	Spring	MATH-190
Type of Course	**Field**	**Language of Instruction**
Elective	Mathematics	English
Level of Course	**Year of Study**	**Lecturer(s)**
1st Cycle	1st	Dr. N. Papanicolaou
Mode of Delivery	**Work Placement**	**Co-requisites**
Face-to-face	N/A	MATH-191

Objectives of the Course:

The main objectives of the course are to:

- Introduce students to the use of Mathematical Software
- Prepare Students for Numerical Analysis courses
- Discuss the concept of computational error
- Familiarize students with Computer Algebra Software
- Demonstrate the use of a CAS in performing operations and solving Calculus and Linear Algebra problems
- Cover plots of symbolically defined functions and datafiles
- Familiarize students with the basics of MATLAB
- Cover topics in Programming with Matlab
- Present applications of Matlab to Linear Algebra
- Introduce the symbolic Math toolbox

Learning Outcomes:

After completing the course students are expected to be able to:

- Use Computer Algebra Software and MATLAB to perform operations.
- Use a CAS to solve problems in Calculus and Linear Algebra
- Apply the techniques and computational skills acquired in more advanced courses such as Differential Equations and Numerical Analysis
- Write and debug programs in Matlab

Course Contents:

1. Introduction:
   - Computer Basics
   - Overview of the use of computers in Mathematics
   - Computational error
2. Computer Algebra Software: (or Matlab's symbolic Math toolbox)
   - Basic Symbolic Computations
   - Representation of numbers and accuracy
   - Built-in functions
   - User-defined functions and more advanced elements. Calculus Applications (e.g. limits, difference quotients)
   - Representation of Sequences and sums. Applications (e.g. Definite Integrals and Riemann Sums)
   - Plots and Graphics
   - Matrices and arrays.
3. Matlab
   - Basic Elements. The Matlab command line
   - Defining and initializing variables. Incrementing and Decrementing
   - Operators, constants and types
   - Vectors and Matrices (Initialization, column and row vectors, operations, the inverse of a matrix)
   - Matlab Programming
     - Matlab Scripts
     - Input and Output. Reading from and writing to files.
     - User Defined Functions
     - Relational Expressions
     - Selection Statements (The If-Else and Switch statements)
     - Loops and Iterations(The For and While loops, nested loops)
     - Modular Programs and Subfunctions
     - Errors and debugging
   - Plotting with Matlab

Learning Activities and Teaching Methods:

Lectures and Computational/Programming Assignments

Assessment Methods:

1 Mid-Term Exam; Computational Assignments, Final Exam.

Required Textbooks/Reading:

Authors	Title	Publisher	Year	ISBN
A. Gilat	MATLAB: An Introduction with Applications	Wiley 4th Edn.	2010	9780470873731
C.K. Cheung, G.E. Keough, R.H. Gross, C. Landraitis	Getting Started with Mathematica	Wiley 3rd Edn.	2009	9780470456873

Recommended Textbooks/Reading:

Authors	Title	Publisher	Year	ISBN
S. Attaway	Matlab: A Practical Introduction to Programming and Problem Solving	Butterworth-Heinemann 2nd Edn.	2011	978-0123850812
T.A. Davis	MATLAB Primer	CRC Press 8th Edn.	2010	978-1439828625