UNIVERSITY of NICOSIA

Course Syllabus

Course Code	Course Title	ECTS Credits
ENGR-290	Numerical Methods Using MATLAB	6
Prerequisites	**Department**	**Semester**
MATH-196, MATH-280	Engineering	Fall or Spring
Type of Course	**Field**	**Language of Instruction**
Required	Engineering	English
Level of Course	**Lecturer(s)**	**Year of Study**
1st Cycle	Dr Marios Kyriakides	2nd
Mode of Delivery	**Work Placement**	**Corequisites**
Face-to-Face	N/A	None

Course Objectives:

The main objectives of the course are to:

- Introduce the most essential numerical methods and computational techniques
- Provide understanding of basic mathematical concepts and principles which, along with numerical methods, can be used for the solution of problems in science and engineering
- Provide understanding of computational issues and commonly-used terms such as round-off error, degree of accuracy, rate of convergence, machine precision, etc.
- Introduce MATLAB programming for the implementation of numerical algorithms for the solution of problems in science and engineering
- Develop computationally efficient and accurate algorithms for the solutions of problems

Learning Outcomes:

After completion of the course students are expected to:

- Write software codes in MATLAB
- Use MATLAB as a programming tool to solve numerical problems in science and engineering and to graphically display the obtained solution
- Solve linear systems of equations using direct and iterative methods
- Solve numerically for the roots of higher-order polynomials
- Use interpolation techniques for curve-fitting of data
- Evaluate numerical differentiation and integration using different methods
- Solve boundary value problems using finite difference and finite element methods

Course Content:

- Introduction to MATLAB programming including arrays and matrix operations, files and built-in functions, logical statements, loops, operators, data structures, plotting, etc.
- Solution of linear systems of equations using direct and iterative methods
- Root finding of higher-order polynomials
- Interpolation and curve fitting using polynomials, sinusoidal functions, Lagrange functions, and splines
- Numerical integration using rectangular and trapezoidal rules, Simpson's rule, and Gauss quadrature
- Numerical differentiation using backward, forward and central difference
- Solution of boundary value problems using finite difference and finite element methods

Learning Activities and Teaching Methods:

Lectures, in-class and take-home examples, computer assignments, and exercises.

Assessment Methods:

Homework, in-class assignments, projects, exams, final exam.

Required Textbooks / Readings:

Title	Author(s)	Publisher	Year	ISBN
Amos Gilat and Vish Subramaniam	Numerical Methods: An introduction with applications using MATLAB	John Wiley & Sons	2011	978-0-470-87374-8

Recommended Textbooks / Readings:

Title	Author(s)	Publisher	Year	ISBN
Numerical Methods for Engineers	Steven C. Chapra and Raymond P. Canale	McGraw Hill	2011	0131111426
Introduction to MATLAB 7 for Engineers	William J. Palm III	McGraw Hill	2004	0131111426