MODULE SPECIFICATION

Part 1: Information			
Module Title	Engineering Mathematics		
Module Code	UFMFJ9-30-1	Level	Level 4
For implementation from	2019-20		
UWE Credit Rating	30	ECTS Credit Rating	15
Faculty	Faculty of Environment & Technology	Field	Engineering, Design and Mathematics
Department	FET Dept of Engin Design & Mathematics		
Module type:	Standard		
Pre-requisites	None		
Excluded Combinations	None		
Co- requisites	None		
Module Entry requirements	None		

Part 2: Description

Educational Aims: Knowledge of a range of mathematical tools which are used to synthesise, analyse and evaluate different engineering situations is fundamental to engineering. The student is introduced to a range of basic mathematical tools which are required and developed in later modules.

Outline Syllabus: Algebra and Functions
Dimensions of physical quantities, revision of standard engineering functions such as polynomials, rational functions, partial fractions, exponential and logarithmic functions and trigonometric functions.

Complex Numbers: Roots of polynomial equations, basic algebraic operations, rectangular, polar and exponential forms, Argand diagram, principal branch, Euler's formula, De Moivre's theorem.

Matrix and Vector Algebra: Properties of matrices and determinants, the inverse matrix, Gaussian elimination, applications to systems of linear equations. Vector and scalar quantities, resolution of forces, properties of vector quantities, vector addition, unit vectors, position vectors, scalar product, vector product. Eigenvalues and eigenvectors.

Calculus

Differential Calculus: Concept of a limit, revision of standard derivatives, linear properties, product rule, quotient rule and chain rule. Higher order derivatives, classification of turning points, parametric differentiation. Sequences and Series, Binomial theorem, MacLaurin series and Taylor series expansions.

Integral Calculus: Revision of standard integrals, indefinite and definite integration, integration by parts, applications of the definite integral such as finding the average value of a function, root mean square calculations, centre of mass and moments of inertia.

Solution of Differential Equations: Modelling of simple systems, solution of first and second order linear constant co-efficient ordinary differential equations, natural and forced response; applications such as cooling problems, mechanical and electrical dynamical systems.

Laplace Transforms: definition, manipulation, standard transforms, inverse transform, solution of linear differential equations.

Computing Methods
Introduction to numerical methods: time-step approach to dynamics problems. Using (for example) Matlab as a tool for engineering analysis, command line, m-files, functions.

Programming structure, “if/then” commands, for loops.
Using software to solve differential equations.

Teaching and Learning Methods: Scheduled teaching hours will take the form of:

Whole group lectures, used to deliver new material and to consolidate previous material

Small-group tutorials, with activities designed to enhance the understanding of the material delivered in the lectures and to apply the skills and knowledge learned from the lectures. These will also include practical sessions to work on PC’s where this is appropriate.

Scheduled classes: 84 hours

Assimilation and development of knowledge: 140 hours

Coursework preparation: 36 hours

Examination preparation: 40 hours

TOTAL: 300 HOURS

The module is delivered by means of lectures and tutorials or workshops. To prepare for assessment, students will be expected to undertake self-directed learning in addition to the directed learning which supports taught classes.

Part 3: Assessment
The examinations are summative and assess the students’ understanding of concepts and techniques, and their ability to apply them in relatively straightforward problems. The coursework is both summative and formative. The computer based tests assesses competency with the mathematical methods taught in the course. Feedback from the coursework is intended to assist students to prepare for the end-of-year examination. The assignment will assess understanding of numerical techniques and competency at writing and implementing software code and as a solution method.

First Sit Components	**Final Assessment**	**Element weighting**	**Description**
Written Assignment - Component B		12.5 %	MATLAB Assignment
Online Assignment - Component B		12.5 %	E-assessment tests
Examination - Component A	✓	52.5 %	Written examination
Examination - Component A		22.5 %	Online examination
Resit Components	**Final Assessment**	**Element weighting**	**Description**
Written Assignment - Component B		12.5 %	MATLAB Assignment
Online Assignment - Component B		12.5 %	E-assessment tests
Examination - Component A	✓	75 %	Written examination

Part 4: Teaching and Learning Methods

Learning Outcomes

On successful completion of this module students will achieve the following learning outcomes:

Module Learning Outcomes	**Reference**
Demonstrate understanding and competency with respect to a range of algebra and functions mathematical techniques which are the basis of the mathematics required in engineering	MO1
Demonstrate understanding and competency with respect to a range of calculus mathematical techniques which are the basis of the mathematics required in engineering	MO2
Demonstrate understanding and competency with respect to a range of mathematical techniques required in the solution of differential equations which are required when analysing engineering problems.	MO3
Design and implement simple numerical algorithms to demonstrate competence in the use of computer software to analyse and solve engineering problems including the writing of simple programs	MO4

Contact Hours

Independent Study Hours:	
Independent study/self-guided study	216
Total Independent Study Hours:	216
Scheduled Learning and Teaching Hours:	
Face-to-face learning	84

	Total Scheduled Learning and Teaching Hours:	84
	Hours to be allocated	300
	Allocated Hours	300
Reading List	*The reading list for this module can be accessed via the following link:* https://uwe.rl.talis.com/modules/ufmfj9-30-1.html	

Part 5: Contributes Towards

This module contributes towards the following programmes of study:

Aerospace Engineering (Design) {Apprenticeship} [Sep][PT][UCW][4yrs] BEng (Hons) 2019-20

Automation and Robotics Engineering {Foundation} [Feb][FT][GCET][4yrs] BEng (Hons) 2018-19

Robotics {Foundation} [Sep][FT][Frenchay][4yrs] BEng (Hons) 2018-19

Robotics {Foundation} [Sep][SW][Frenchay][5yrs] BEng (Hons) 2018-19

Mechanical Engineering {Foundation} [Sep][SW][Frenchay][5yrs] BEng 2018-19

Electronics and Telecommunication Engineering [Feb][FT][GCET][4yrs] BEng (Hons) 2018-19

Mechanical Engineering and Vehicle Technology [Feb][FT][GCET][4yrs] BEng (Hons) 2018-19

Mechanical Engineering and Vehicle Technology [Oct][FT][GCET][4yrs] BEng (Hons) 2018-19

Electronics and Telecommunication Engineering [Oct][FT][GCET][4yrs] BEng (Hons) 2018-19

Automation and Robotics Engineering {Foundation} [Oct][FT][GCET][4yrs] BEng (Hons) 2018-19

Instrumentation and Control Engineering {Foundation} [Feb][FT][GCET][4yrs] BEng (Hons) 2018-19

Aerospace Engineering with Pilot Studies {Foundation} [Sep][FT][Frenchay][4yrs] BEng (Hons) 2018-19

Aerospace Engineering with Pilot Studies (Design) {Foundation} [Sep][FT][Frenchay][4yrs] BEng (Hons) 2018-19

Aerospace Engineering with Pilot Studies (Design) {Foundation} [Sep][SW][Frenchay][5yrs] BEng (Hons) 2018-19

Automotive Engineering {Foundation} [Sep][FT][Frenchay][5yrs] MEng 2018-19

Automotive Engineering {Foundation} [Sep][SW][Frenchay][6yrs] MEng 2018-19

Automotive Engineering {Foundation} [Sep][FT][Frenchay][4yrs] BEng (Hons) 2018-19

Automotive Engineering {Foundation} [Sep][SW][Frenchay][5yrs] BEng (Hons) 2018-19

Mechanical Engineering [Sep][PT][Frenchay][7yrs] MEng 2018-19

Mechanical Engineering {Foundation} [Sep][FT][Frenchay][4yrs] BEng 2018-19

Mechanical Engineering {Foundation} [Sep][FT][Frenchay][5yrs] MEng 2018-19

Mechanical Engineering {Foundation} [Sep][SW][Frenchay][6yrs] MEng 2018-19

Aerospace Engineering with Pilot Studies (Manufacturing) {Foundation} [Sep][FT][Frenchay][4yrs] BEng (Hons) 2018-19

Aerospace Engineering with Pilot Studies (Systems) {Foundation} [Sep][FT][Frenchay][4yrs] BEng (Hons) 2018-19

Aerospace Engineering with Pilot Studies (Manufacturing) {Foundation} [Sep][SW][Frenchay][5yrs] BEng (Hons) 2018-19

Aerospace Engineering with Pilot Studies (Systems) {Foundation} [Sep][SW][Frenchay][5yrs] BEng (Hons) 2018-19

Instrumentation and Control Engineering {Foundation} [Oct][FT][GCET][4yrs] BEng (Hons) 2018-19
Mechanical Engineering [Sep][PT][Frenchay][6yrs] BEng 2018-19
Mechanical Engineering [Sep][PT][COBC][6yrs] BEng 2018-19
Mechanical Engineering {Apprenticeship} [Sep][PT][Frenchay][6yrs] BEng 2018-19
Aerospace Engineering (Systems) {Foundation} [Sep][FT][Frenchay][4yrs] BEng (Hons) 2018-19
Aerospace Engineering {Foundation} [Sep][FT][Frenchay][4yrs] BEng (Hons) 2018-19
Aerospace Engineering (Design) {Foundation} [Sep][FT][Frenchay][4yrs] BEng (Hons) 2018-19
Aerospace Engineering (Design) {Foundation} [Sep][SW][Frenchay][5yrs] BEng (Hons) 2018-19
Aerospace Engineering (Manufacturing) {Foundation} [Sep][FT][Frenchay][4yrs] BEng (Hons) 2018-19
Aerospace Engineering (Manufacturing) {Foundation} [Sep][SW][Frenchay][5yrs] BEng (Hons) 2018-19
Electronic Engineering [Sep][PT][Frenchay][6yrs] BEng (Hons) 2018-19
Electronic Engineering {Foundation} [Sep][FT][Frenchay][4yrs] BEng (Hons) 2018-19
Electronic Engineering {Foundation} [Sep][SW][Frenchay][5yrs] BEng (Hons) 2018-19