MODULE SPECIFICATION

Part 1: Information			
Module Title	Sets, Functions and Linear Algebra		
Module Code	UFMFL3-30-1	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: Two of the most important skills that distinguish a mathematical scientist from other kinds of scientist (and which make them so attractive to employers) are (i) the ability to construct very precise logical arguments and (ii) to abstract from the specific case to the general. This abstraction to generality enables the mathematical scientist to apply ingenious, elegant and powerful techniques to a huge range of applied problems in science, engineering, social science and culture. This module is designed to develop these skills and to demonstrate the connections between abstract mathematical concepts and applications.

Outline Syllabus: Mathematical Foundations (Sets and Functions):

Propositional logic: propositions, connectives, truth tables, implications

Proof: methods of proof, direct, contradiction, contrapositive, induction

Set theory: operations on sets, power sets, subsets, Cartesian products, quantifiers

Functions: injections, surjections, bijections, inverses

Number systems: integers, rationals, reals, complex numbers, concept of a field

Complex numbers: construction, algebra, geometry, nth roots, polynomial equations

Linear Algebra:

Vector algebra: dot and cross products, the angle between two vectors, equations and intersections of lines and planes

Matrices: algebra, geometrical transformations, determinants, inverses, diagonal, orthogonal and symmetric matrices

Systems of linear equations: Gaussian elimination

Eigenvalues and eigenvectors

Vector spaces: subspaces, independent vectors, basis vectors, dimensions

Linear transformations: range and kernel

Inner-product spaces

Teaching and Learning Methods: Scheduled teaching hours takes the form of:

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

Small-group tutorials, with activities designed to reinforce analytical and manipulation skills

A fortnightly workshop session used for contextualization in an applied setting or for more challenging examples

Contact time: 72 hours

Assimilation and development of knowledge: 150 hours

Coursework preparation: 22 hours

Examination preparation: 56 hours

TOTAL: 300 HOURS

During the module, connections will be drawn between the underlying abstract concepts and the methods and techniques used in problem solving and applications. Application areas may vary from year to year to reflect current staff expertise or recent scientific developments, but typical examples might include: modelling of complex networks (such as social networks or traffic networks); computer graphics; decision modelling and optimisation.

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

Part 3: Assessment
Component A consists of examination(s) which assess the student's understanding of concepts and techniques, and their ability to apply them in relatively straightforward problems. Component B consists of a series of computer-based online tests (e-assessments) using UWE's DEWIS system, designed to test understanding of material covered in the period immediately preceding each test.

First Sit Components	Final Assessment	Element weighting	Description
Online Assignment - Component B		25 %	E-assessments
Examination - Component A		19 %	January written exam
Examination - Component A	✓	56 %	Summer written exam
Resit Components	**Final Assessment**	**Element weighting**	**Description**
Online Assignment - Component B		25 %	E-assessments
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
Give clear definitions of mathematical concepts, state theorems precisely, and construct rigorous mathematical proofs	MO1
Use appropriate notation, logic, concepts and techniques to clearly and effectively communicate mathematical arguments	MO2
Select and apply appropriate techniques to solve systems of linear equations and to solve problems in Euclidean geometry	MO3
Select and apply appropriate techniques to analyse and solve problems from a range of application areas	MO4

Contact Hours

Independent Study Hours:	
Independent study/self-guided study	228
Total Independent Study Hours:	228
Scheduled Learning and Teaching Hours:	
Face-to-face learning	72
Total Scheduled Learning and Teaching Hours:	72
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/ufmfl3-30-1.html

Part 5: Contributes Towards
This module contributes towards the following programmes of study: Mathematics and Statistics {Foundation} [Sep][FT][Frenchay][4yrs] BSc (Hons) 2018-19 Mathematics and Statistics {Foundation} [Sep][SW][Frenchay][5yrs] BSc (Hons) 2018-19 Mathematics {Foundation} [Sep][SW][Frenchay][5yrs] BSc (Hons) 2018-19 Mathematics {Foundation} [Sep][FT][Frenchay][4yrs] BSc (Hons) 2018-19 Mathematics with Qualified Teacher Status (QTS) {Foundation} [Sep][FT][Frenchay][4yrs] BSc (Hons) 2018-19