MODULE SPECIFICATION

Part 1: Information			
Module Title	Coding Theory and Applications		
Module Code	UFMFQ7-15-2	Level	Level 5
For implementation from	2018-19		
UWE Credit Rating	15	ECTS Credit Rating	7.5
Faculty	Faculty of Environment & Technology	Field	Engineering, Design and Mathematics
Department	FET Dept of Engin Design & Mathematics		
Contributes towards			
Module type:	Standard		

Pre-requisites	Sets, Functions and Linear Algebra 2018-19
Excluded Combinations	None
Co- requisites	None
Module Entry requirements	None

Part 2: Description

Educational Aims: In this module you will find out how concepts from abstract algebra can be applied to real-life problems such as how to send secret messages, how to reconstruct information which has been damaged and how to store and transmit data efficiently.

You will look at applications of group theory, finite fields and linear algebra to these problems.

In addition to the Learning Outcomes, the educational experience may explore, develop, and practise but not formally discretely assess the following:

Use of a computer algebra package to analyse and solve problems.

Outline Syllabus: Introduction:

What we mean by 'coding theory': coding for compression, errorcorrection, secrecy
Prefix-free codes
Optimal codes, entropy and uncertainty
Noisy channels and the problem of reliable communication
Review of concepts from algebra: groups, finite fields, linear algebra, number theory.

Data compression:
Block codes/ stream codes,
Algorithms, eg Huffman coding, LZW

Error-correcting codes:
Linear codes,
Hamming codes,
Cyclic codes
Applications to barcoding

Cryptography:
Symmetric cryptosystems: pencil and paper codes, one time pad, DES, AES
Public key cryptosystems: RSA, El Gamal, Diffie-Hellman, Elliptic Curve cryptography

Teaching and Learning Methods: Scheduled learning will include lectures/seminars, where students will discuss essential reading, and practical sessions which may include computer-based tutorials.

Independent learning will include hours engaged with essential reading, assignment preparation and completion.

Scheduled teaching hours: 36
Reading and assimilation time: 54
Coursework: 30
Exam preparation time: 30
Total: 150 hours

Part 3: Assessment

Component A consists of a 2 hour examination which assesses the student's understanding of concepts and techniques, and their ability to apply them in relatively straightforward problems.

Component B is an assignment consisting of problems of a more extended nature which require analysis and exploration to solve. It will also include a short report, designed to introduce students to literature review, analysis of texts and referencing in preparation for undertaking a final year project.

First Sit Components	**Final Assessment**	**Element weighting**	**Description**
Set Exercise - Component B		50 %	Assignment
Examination - Component A	✓	50 %	2 hour Exam (final assessment)
Resit Components	**Final Assessment**	**Element weighting**	**Description**
Set Exercise - Component B		50 %	Assignment
Examination - Component A	✓	50 %	2 hour Exam (final assessment)

Part 4: Teaching and Learning Methods

Learning Outcomes

On successful completion of this module students will be able to:

	Module Learning Outcomes
MO1	Define mathematical concepts and state theorems precisely, and construct rigorous mathematical proofs
MO2	Use appropriate notation, logic, concepts and techniques to communicate mathematical arguments clearly and effectively
MO3	Select and apply appropriate techniques from abstract algebra to solve problems in coding theory
MO4	Undertake short literature reviews and use appropriate research and reporting techniques, such as referencing materials, library search

Contact Hours

Contact Hours	
Independent Study Hours:	
Independent study/self-guided study	114
Total Independent Study Hours:	114
Scheduled Learning and Teaching Hours:	
Face-to-face learning	36
Total Scheduled Learning and Teaching Hours:	36
Hours to be allocated	150
Allocated Hours	150

Reading List

The reading list for this module can be accessed via the following link:

https://uwe.rl.talis.com/modules/ufmfq7-15-2.html