MODULE SPECIFICATION

Part 1: Information			
Module Title	Networks and Graphs		
Module Code	UFMFKH-15-M	Level	Level 7
For implementation from	2019-20		
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		
Module type:	Standard		
Pre-requisites	None		
Excluded Combinations	None		
Co- requisites	None		
Module Entry requirements	None		

Part 2: Description

Educational Aims: See Learning Outcomes.

Outline Syllabus: This module will introduce students to networks, graphs and their applications and will cover:

Advanced Graph Theory (theoretical results required for algorithms and applications)

Graph Theoretic Heuristics (e.g. TSP, local search, Lin-Kernighan heuristic)

Optimisation Algorithms (e.g. minimum spanning tree, shortest path algorithms: Dijkstra's, Floyd's)

Transportation Networks (e.g. maximum flow, transportation problems, Ford-Fulkerson theorem)

Traffic Network Design (e.g. equilibrium flow, traffic network design problem, Braess' paradox)

Electrical Networks (e.g. analysis of simple electrical networks, printed circuit design)

Application to Industrial Engineering (e.g. facilities layout)

Applications to Physics, Chemistry and Biology (e.g. evolutionary trees)

Further applications (e.g. Dynamic Programming, Markov Chains, Social Networks)

Teaching and Learning Methods: The module syllabus is delivered by means of lectures, to introduce and develop new material and provide context. Problems Classes/Workshops will be used to develop model building and problem solving skills.

Tutorials will offer mathematical support, guidance and feedback. Students will have the opportunity to ask individual questions about problems they may be having with homework exercises, lecture material, assessment preparation, etc.

Scheduled learning includes lectures, problems classes and tutorials.

Independent learning includes hours engaged with essential reading. These sessions constitute an average time per level.
To prepare for assessment, students will be expected to undertake both directed and self-directed learning in addition to the directed learning which supports taught classes.

Part 3: Assessment

The assessment strategy consists of a 3-hour examination, which assesses students' understanding of underlying concepts and techniques, and their ability to apply them to challenging problems. The examination consists of a combination of unseen and partially seen questions. The partially seen question(s) will be based on reading/resources identified by the lecturer during teaching delivery and students will have the opportunity to engage with this material well in advance of the examination.

The assessment method (wholly by examination) will prevent plagiarism and is aligned with the programme's assessment strategy to enable students to manage coursework workloads effectively.

First Sit Components	**Final Assessment**	**Element weighting**	**Description**
Examination - Component A	✓	100 %	Examination 3 hours
Resit Components	**Final Assessment**	**Element weighting**	**Description**
Examination - Component A	✓	100 %	Examination 3 hours

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
Show a detailed knowledge and understanding of the modelling process for various graph-theoretic approaches and network applications	MO1
Understand the strengths and limitations of graph-theoretic modelling and solution methods, including their use in practical situations	MO2
Demonstrate awareness of current advances and controversies in the field	MO3
Select and appraise appropriate graph-algorithmic and optimisation techniques to solve a variety of problems	MO4
Apply sound theoretical knowledge to the solution of real context of problems and appropriately interpret the solutions provided by the models	MO5

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/index.html

Part 5: Contributes Towards

This module contributes towards the following programmes of study: