University of the West of Scotland

Module Descriptor

Session: 2024/25

Title of Module: Discrete Mathematics 2			
Code: MATH08006	**SCQF Level: 8 (Scottish Credit and Qualifications Framework)**	**Credit Points: 20**	**ECTS: 10 (European Credit Transfer Scheme)**
School:	School of Computing, Engineering and Physical Sciences		
Module Co-ordinator:	Dr Kwok Chi Chim		

Summary of Module

This module extends the ideas of discrete mathematics introduced in Discrete Mathematics (MATH07002). Below is a list of the topics that will be covered.

Recurrence relations:
Recurrence relations, first and second order linear difference equations, stability of solutions, fixed points and their stability, population models using recurrence relations, harvesting.

Number theory:
Divisibility, Euclid's lemma, Euclid's algorithm, linear Diophantine equations; definition of a prime, fundamental theorem of arithmetic, Sieve of Eratosthenes, Fermat's factorization method, congruences and their properties, linear congruences.

Graph theory:
Definition and representations of graphs, valency, paths and cycles, Hamiltonian cycle, trees, Euler's formula, weighted graph, definitions of digraph and network, shortest path problem, Djikstra's algorithm, minimum spanning tree, Kruskal's algorithm, Prim's algorithm, Havel-Hakimi algorithm.

The Graduate Attributes relevant to this module are given below:
- Academic: Critical thinker; Analytical; Inquiring; Knowledgeable; Problem-solver; Autonomous.
- Personal: Motivated; Resilient
- Professional: Ambitious; Driven.

Module Delivery Method

Face-To-Face	**Blended**	**Fully Online**	**HybridC**	**Hybrid 0**	**Work-Based Learning**
☒	☐	☐	☐	☐	☐

See Guidance Note for details.

Campus(es) for Module Delivery						
The module will **normally** be offered on the following campuses / or by Distance/Online Learning: (Provided viable student numbers permit) (tick as appropriate)						
Paisley:	Ayr:	Dumfries:	Lanarkshire:	London:	Distance/Online Learning:	Other:
☒	☐	☐	☐	☐	☐	Add name

Term(s) for Module Delivery					
(Provided viable student numbers permit).					
Term 1	☐	Term 2	☒	Term 3	☐

Learning Outcomes: (maximum of 5 statements) **These should take cognisance of the SCQF level descriptors and be at the appropriate level for the module.** At the end of this module the student will be able to:	
L1	Demonstrate a knowledge and understanding of a range of techniques involving recurrence relations.
L2	Apply number theory results to problems in divisibility and the solving of linear Diophantine equations.
L3	Implement the fundamental concepts in graph theory to a range of problems.

Employability Skills and Personal Development Planning (PDP) Skills	
SCQF Headings	During completion of this module, there will be an opportunity to achieve core skills in:
Knowledge and Understanding (K and U)	SCQF Level **8** Demonstrating a knowledge and understanding of a range of standard techniques in discrete mathematics. Demonstrating critical awareness of established techniques of enquiry in applications of these techniques.
Practice: Applied Knowledge and Understanding	SCQF Level **8** Using a range of standard techniques to solve problems at an advanced level, sometimes in non-routine contexts. Carrying out defined investigative problems within a mathematically based subject.

Generic Cognitive skills	SCQF Level **8** Conceptualising and analysing problems informed by professional and research issues.	
Communication, ICT and Numeracy Skills	SCQF Level **8** Making formal written presentation(s) based on the output from an investigative problem.	
Autonomy, Accountability and Working with others	SCQF Level **8** Exercising independence and initiative in carrying out a range of activities. Identifying learning needs through reflection based on self, tutor and peer evaluation of work.	
Pre-requisites:	Before undertaking this module the student should have undertaken the following:	
	Module Code: MATH07002	**Module Title:** Discrete Mathematics 1
	Other:	or equivalent
Co-requisites	**Module Code:**	**Module Title:**

*Indicates that module descriptor is not published.

Learning and Teaching	
In line with current learning and teaching principles, a 20-credit module includes 200 learning hours, normally including a minimum of 36 contact hours and maximum of 48 contact hours.	
Learning Activities During completion of this module, the learning activities undertaken to achieve the module learning outcomes are stated below:	**Student Learning Hours** (Normally totalling 200 hours): (Note: Learning hours include both contact hours and hours spent on other learning activities)
Lecture/Core Content Delivery	24
Tutorial/Synchronous Support Activity	12
Independent Study	164
	200 Hours Total
****Indicative Resources: (eg. Core text, journals, internet access)**	

The following materials form essential underpinning for the module content and ultimately for the learning outcomes:

“Discrete Mathematics” class notes as published on the University VLE.

“Discrete Mathematics with Graph Theory, E Goodaire”, M Parmenter

"Discrete and Combinatorial Mathematics", RP Grimaldi

"Elementary Number Theory", D Burton

"Introduction to Graph Theory", RJ Wilson

"Discrete Mathematics", NL Biggs

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Please ensure the list is kept short and current. Essential resources should be included, broader resources should be kept for module handbooks / Aula VLE.

Resources should be listed in Right Harvard referencing style or agreed professional body deviation and in alphabetical order.

(**N.B. Although reading lists should include current publications, students are advised (particularly for material marked with an asterisk*) to wait until the start of session for confirmation of the most up-to-date material)

Attendance and Engagement Requirements

In line with the Student Attendance and Engagement Procedure: Students are academically engaged if they are regularly attending and participating in timetabled on-campus and online teaching sessions, asynchronous online learning activities, course-related learning resources, and complete assessments and submit these on time.

Equality and Diversity

The University's Equality, Diversity and Human Rights Procedure can be accessed at the following link: UWS Equality, Diversity and Human Rights Code.

Please ensure any specific requirements are detailed in this section. Module Co-ordinators should consider the accessibility of their module for groups with protected characteristics..

(N.B. Every effort will be made by the University to accommodate any equality and diversity issues brought to the attention of the School)

Supplemental Information

Divisional Programme Board	Engineering and Physical Sciences
Assessment Results (Pass/Fail)	Yes ☐No ☒
School Assessment Board	Computing, Engineering and Physical Sciences
Moderator	Dr Kenneth C Nisbet
External Examiner	P Wilson
Accreditation Details	e.g. ACCA Click or tap here to enter text.
Changes/Version Number	1.09 Change to the summary of module. Change to assessment. Change to indicative resources. Minor change to supplemental information

Assessment: (also refer to Assessment Outcomes Grids below)
Assessment 1: A series of coursework assignments (50%)
Assessment 2: Class Test (Unseen, closed book) (50%)
(N.B. (i) **Assessment Outcomes Grids** for the module (one for each component) can be found below which clearly demonstrate how the learning outcomes of the module will be assessed. (ii) An **indicative schedule** listing approximate times within the academic calendar when assessment is likely to feature will be provided within the Student Module Handbook.)

Assessment Outcome Grids (See Guidance Note)

Component 1							
Assessment Type (Footnote B.)	**Learning Outcome (1)**	**Learning Outcome (2)**	**Learning Outcome (3)**	**Learning Outcome (4)**	**Learning Outcome (5)**	**Weighting (%) of Assessment Element**	**Timetabled Contact Hours**
Class Test (unseen, closed book)	✓	✓	✓			50%	2

Component 2							
Assessment Type (Footnote B.)	**Learning Outcome (1)**	**Learning Outcome (2)**	**Learning Outcome (3)**	**Learning Outcome (4)**	**Learning Outcome (5)**	**Weighting (%) of Assessment Element**	**Timetabled Contact Hours**
Coursework	✓	✓	✓			50%	

Combined Total for All Components	**100%**	**2 hours**