Module Descriptor

Title	Discrete Mathematics 2		
Session	2025/26	**Status**	Published
Code	MATH08006	**SCQF Level**	8 (Scottish Credit and Qualifications Framework)
Credit Points	20	**ECTS (European Credit Transfer Scheme)**	10
School	**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.

Proofs:

Proof of existence and uniqueness, proof by exhaustion, mathematical induction, proof by contrapositive, proof by contradiction.

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	On-Campus[1] ☒	Hybrid[2] ☐	Online[3] ☐	Work -Based Learning[4] ☐
Campuses for Module Delivery	☐ Ayr ☐ Dumfries	☐ Lanarkshire ☐ London ☒ Paisley	☐ Online / Distance Learning ☐ Other (specify)	

Terms for Module Delivery	Term 1	☐	Term 2	☒	Term 3	☐
Long-thin Delivery over more than one Term	Term 1 – Term 2	☐	Term 2 – Term 3	☐	Term 3 – Term 1	☐

Learning Outcomes	
L1	Demonstrate the ability to apply techniques of proofs in solving mathematical problems.
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.
L4	
L5	

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 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 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.

[1] Where contact hours are synchronous/ live and take place fully on campus. Campus-based learning is focused on providing an interactive learning experience supported by a range of digitally-enabled asynchronous learning opportunities including learning materials, resources, and opportunities provided via the virtual learning environment. On-campus contact hours will be clearly articulated to students.

[2] The module includes a combination of synchronous/ live on-campus and online learning events. These will be supported by a range of digitally-enabled asynchronous learning opportunities including learning materials, resources, and opportunities provided via the virtual learning environment. On-campus and online contact hours will be clearly articulated to students.

[3] Where all learning is solely delivered by web-based or internet-based technologies and the participants can engage in all learning activities through these means. All required contact hours will be clearly articulated to students.

[4] Learning activities where the main location for the learning experience is in the workplace. All required contact hours, whether online or on campus, will be clearly articulated to students

Generic Cognitive skills	**SCQF 8** Conceptualising and analysing problems informed by professional and research issues. Ability to present a valid mathematical argument to establish a mathematical statement.
Communication, ICT and Numeracy Skills	**SCQF 8** Making formal written presentation(s) based on the output from an investigative problem.
Autonomy, Accountability and Working with Others	**SCQF 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.

Prerequisites	**Module Code** MATH07002	**Module Title** Discrete Mathematics 1
	Other or equivalent	
Co-requisites	**Module Code**	**Module Title**

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** (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
Please select	
Please select	
Please select	
TOTAL	200 Hours Total

Indicative Resources
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

(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.

For the purposes of this module, academic engagement equates to the following:

The School of Computing, Engineering and Physical Sciences considers attendance and engagement to mean a commitment to attending, and engaging in, timetabled sessions. You will scan your attendance via the scanners each time you are on-campus and you will login to the VLE several times per week. Where you are unable to attend a timetabled learning session due to illness or other circumstance, you should notify the Programme Leader that you cannot attend. Across the School an 80% attendance threshold is set. If you fall below this, you will be referred to the Student Success Team to see how we can best support your studies.

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.

Aligned with the University's commitment to equality and diversity, this module supports equality of opportunity for students from all backgrounds and learning needs. Using the VLE, material will be presented electronically in formats that allow flexible access and manipulation of content. This module complies with University regulations and guidance on inclusive learning and teaching practice. Specialist assistive equipment, support provision and adjustment to assessment practice in accordance with the University's policies and regulations.

(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 Physical Sciences**
Overall Assessment Results	☐ **Pass / Fail** ☒ **Graded**
Module Eligible for Compensation	☒ **Yes** ☐ **No** **If this module is eligible for compensation, there may be cases where compensation is not permitted due to programme accreditation requirements. Please check the associated programme specification for details.**
School Assessment Board	Computing, Engineering and Physical Sciences
Moderator	Dr Kenneth C Nisbet

External Examiner	P Wilson
Accreditation Details	
Module Appears in CPD catalogue	☐ **Yes** ☒ **No**
Changes / Version Number	1.10 Change to summary of module Change to learning outcomes Change to employability skills and personal development planning (PDP) skills Change to attendance and engagement requirements Change to equality and diversity

Assessment (also refer to Assessment Outcomes Grids below)
Assessment 1
Class Test (Unseen, closed book) (50%)
Assessment 2
A series of coursework assignments (50%)
Assessment 3
(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.)

Component 1							
Assessment Type	**LO1**	**LO2**	**LO3**	**LO4**	**LO5**	**Weighting of Assessment Element (%)**	**Timetabled Contact Hours**
Class Test (unseen, closed book)	☒	☒	☒	☐	☐	50%	2

Component 2							
Assessment Type	**LO1**	**LO2**	**LO3**	**LO4**	**LO5**	**Weighting of Assessment Element (%)**	**Timetabled Contact Hours**
Coursework	☒	☒	☒	☐	☐	50%	

Component 3							
Assessment Type	**LO1**	**LO2**	**LO3**	**LO4**	**LO5**	**Weighting of Assessment Element (%)**	**Timetabled Contact Hours**
	☐	☐	☐	☐	☐		

Combined total for all components	100%	2 hours

Change Control

What	When	Who
Change to summary of module Change to learning outcomes Change to employability skills and personal development planning (PDP) skills Change to attendance and engagement requirements Change to equality and diversity	March 2025	Dr. Kwok Chi Chim