Module Descriptor

Title	Mathematics for Design		
Session	2025/26	**Status**	Published
Code	MATH08001	**SCQF Level**	8
Credit Points	20	**ECTS (European Credit Transfer Scheme)**	10
School	**Computing, Engineering and Physical Sciences**		
Module Co-ordinator	Dr Kenneth Nisbet		

Summary of Module

This module builds on the algebra and calculus studied at Level 7.

The content includes:

Three-Dimensional Geometry: lines and planes

Multivariable Calculus: partial differentiation and applications, double integration

Differential Equations: up to second order, first order systems (using eigenvalues/eigenvectors).

Examples and exercises test the basic concepts and show the applications of this material in engineering contexts.

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	Calculate, determine, and state solutions to mathematical problems arising in three dimensions.
L2	Apply basic techniques in partial differentiation in routine and non-routine contexts.
L3	Apply basic techniques in multiple integration in routine and non-routine contexts.
L4	Use standard methods to solve differential equations up to second order.
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** Knowledge of the geometry of lines and planes in three dimensions, multivariable calculus, and standard differential equations. An ability to demonstrate awareness of the applicability of mathematics to the solution of problems in engineering.
Practice: Applied Knowledge and Understanding	**SCQF 8** An ability to perform calculations correctly, for each of the above, in routine contexts.

[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

	An ability to apply a range of methods in mathematics to conduct investigations in engineering.
Generic Cognitive skills	**SCQF 8** Presenting mathematical arguments, such as calculations and solutions to practical examples. An ability to make some critical evaluation of the solution to a mathematical problem.
Communication, ICT and Numeracy Skills	**SCQF 8** Ability to synthesise and communicate the results of a range of mathematical processes.
Autonomy, Accountability and Working with Others	**SCQF 8** An ability to autonomously construct a solution to a mathematical problem. Identifying and addressing learning needs both during and outside class time.

Prerequisites	**Module Code** MATH07011	**Module Title** Applied Mathematics
	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	18
Tutorial / Synchronous Support Activity	18
Independent Study	164
Please select	
Please select	
Please select	
TOTAL	200

Indicative Resources

The following materials form essential underpinning for the module content and ultimately for the learning outcomes: "Mathematics for Design" class notes as published on the University VLE. "Calculus: One and Several Variables", SL Salas, GJ Etgen & E Hille.
(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 are 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	Physical Sciences
Moderator	tbc

External Examiner	Dr Chris Guiver
Accreditation Details	This module is part of the MSc Chemical Engineering programme accredited by the IChemE, accredited by Joint Board of Moderators of the ICE, IStructE, IHE and CIHT as part of BEng (Hons) Civil Engineering, and by IMechE as part of BEng(Hons) Mechanical Engineering.
Module Appears in CPD catalogue	☐ **Yes** ☒ **No**
Changes / Version Number	2.16. Updated prerequisite.

Assessment (also refer to Assessment Outcomes Grids below)
Assessment 1
A series of individual coursework assignments (50%)
Assessment 2
Class Test (Unseen, closed book) (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**
Coursework Assignment	☒	☒	☒	☒	☐	50	0

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

Component 3							
Assessment Type	**LO1**	**LO2**	**LO3**	**LO4**	**LO5**	**Weighting of Assessment Element (%)**	**Timetabled Contact Hours**
	☐	☐	☐	☐	☐		
Combined total for all components						100%	hours

Change Control

What	When	Who
Updated prerequisite	March 2025	Kenneth Nisbet
Moderator	March 2025	Kenneth Nisbet