Module Descriptor

Title	Differential Equations 2		
Session	2025/26	**Status**	Published
Code	MATH09002	**SCQF Level**	9
Credit Points	20	**ECTS (European Credit Transfer Scheme)**	10
School	**Computing, Engineering and Physical Sciences**		
Module Co-ordinator	Dr Kenneth Nisbet		

Summary of Module

Further topics in calculus will be studied, building on those appearing in MATH08002 and MATH08008. Further common problems in integration will be studied such as the use of Gamma and Beta functions.

The construction of Fourier series will be discussed, together with their properties. Use of Fourier series to solve certain ODEs will be introduced. Mention will be made of Fourier transforms.

Other methods of solution of first order differential equations will be considered, e.g. exact equations. Qualitative analysis of autonomous nonlinear equations will be considered.

Series solution methods, including the method of Frobenius and an introduction to Bessel functions and other special functions, will be studied.

Systems: Both quantitative and qualitative methods in the study of linear and nonlinear first order systems will be considered. This will include the use of Laplace transforms and eigenvalue/eigenvector methods.

Suitable software will be used to solve more elaborate problems in these topics.

The Graduate Attributes relevant to this module are given below:

- Academic: Critical thinker; Analytical; Inquiring; Knowledgeable; Problem-solver; Autonomous; Incisive; Innovative.
- 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	Solve a range of calculus problems involving definite integrals and/or special functions.
L2	Use a range of techniques in the solution and qualitative analysis of ordinary differential equations.
L3	Use a range of techniques in the solution of systems of ordinary differential equations.
L4	Solve a range of problems in calculus using suitable software.
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 9** Understanding some of the techniques used to solve ordinary differential equations. Demonstrating awareness of established techniques of enquiry in the use of ordinary differential equations in applications
Practice: Applied Knowledge and Understanding	**SCQF 9** Using a range of mathematical techniques to obtain solutions of problems.

[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

	Using a range of specialised techniques to solve ordinary differential equations.
Generic Cognitive skills	**SCQF 9** Demonstrating a critical understanding of fundamental mathematical concepts. Demonstrating a critical understanding of the validity and limitations of mathematical techniques
Communication, ICT and Numeracy Skills	**SCQF 9** Using the output from mathematical reasoning, both manually and via software, to communicate results in a coherent way.
Autonomy, Accountability and Working with Others	**SCQF 9** Collaborating in a small team to investigate and solve problems in mathematics. Producing reports describing the solution of problems in mathematics.

Prerequisites	**Module Code** MATH08002	**Module Title** Differential Equations 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
Laboratory / Practical Demonstration / Workshop	12
Independent Study	152
Please select	
Please select	
TOTAL	200

Indicative Resources

The following materials form essential underpinning for the module content and ultimately for the learning outcomes: "Differential Equations 2" class notes as published on the University VLE. Suitable bespoke mathematical software. "Differential Equations", FR Giordano and MD Weir.
(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. This module has computer lab-based teaching and as such you are advised to speak to the Module Co-ordinator to ensure that specialist assistive equipment, support provision and adjustment to assessment practice can be put in place, 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	Dr Wan Mekwi
External Examiner	Dr Chris Guiver
Accreditation Details	
Module Appears in CPD catalogue	☐ **Yes** ☒ **No**
Changes / Version Number	2. 13. Contact time for Component 2 tidied up

Assessment (also refer to Assessment Outcomes Grids below)
Assessment 1
Class Test (Unseen, closed book)
Assessment 2
A series of individual coursework assignments
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)	☒	☒	☒	☐	☐	70	2

Component 2							
Assessment Type	**LO1**	**LO2**	**LO3**	**LO4**	**LO5**	**Weighting of Assessment Element (%)**	**Timetabled Contact Hours**
Coursework Assignmen	☒	☒	☒	☒	☐	30	0

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**

Contact time for Component 2 tidied up	March 2025	Kenneth Nisbet