University of the West of Scotland

Module Descriptor

Session: 2024/25

Title of Module: Differential Equations 1			
Code: MATH08002	**SCQF Level: 8 (Scottish Credit and Qualifications Framework)**	**Credit Points: 20**	**ECTS: 10 (European Credit Transfer Scheme)**
School:	School of Computing, Engineering & Physical Sciences		
Module Co-ordinator:	Dr Alan Walker		

Summary of Module

This module introduces differential equations.

First and higher order ordinary differential equations are studied.

A range of solution methods that do not rely on integration are covered, including, but not restricted to, using Laplace transforms, undetermined coefficients, superposition, and characteristic equations.

A similar range of solution methods involving integration are covered, including, but not restricted to, separation of variables, use of integrating factors, substitutions, and variation of parameters.

Some applications of differential equations are considered, such as radioactive decay, Newton's Law of Cooling, motion in a gravitational field, and mechanical vibrations, including simple harmonic motion, undamped vibrations, damped vibrations and forced vibrations.

Bespoke mathematical software will be used to study problems in non-routine contexts.

The Graduate Attributes relevant to this module are given below:

- Academic: Critical thinker; Analytical; Inquiring; Knowledgeable; Problem-solver; Digitally literate; 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	Use integration methods to solve ordinary differential equations.
L2	Solve linear, higher order differential equations using the method of undetermined coefficients.
L3	Use Laplace Transforms to solve ordinary differential equations.
L4	Use mathematical software to produce and analyse the solution of ordinary differential equations.

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** Broad knowledge of analytical methods for the solution of differential equations. Ability to demonstrate awareness of the application of differential equations in engineering and science.
Practice: Applied Knowledge and Understanding	SCQF Level **8** Select and apply a range of routine techniques to obtain solutions to differential equations. Ability to apply a range of methods to conduct investigations in engineering and science.

Generic Cognitive skills	SCQF Level **8** Presenting mathematical arguments based on critical analysis such as calculations and solutions to practical problems in routine contexts. Explaining mathematical reasoning and calculation in a basic way.	
Communication, ICT and Numeracy Skills	SCQF Level **8** Use a wide range of routine skills and some advanced and specialised skills associated with differential equations to convey complex information to a range of audiences and for a range of purposes. These skills will include the use of suitable mathematical software.	
Autonomy, Accountability and Working with others	SCQF Level **8** Working in a small group to solve mathematical problems. Identifying and addressing their own learning needs and obtaining help from academic staff, both during and outside class time.	
Pre-requisites:	Before undertaking this module, the student should have undertaken the following:	
	Module Code: MATH07003	**Module Title: Calculus A**
	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
Laboratory/Practical Demonstration/Workshop	12
Independent Study	152

	Hours Total 200

****Indicative Resources: (e.g. Core text, journals, internet access)**
The following materials form essential underpinning for the module content and ultimately for the learning outcomes: "Differential Equations" class notes as published on the University VLE. Suitable bespoke mathematical software. "Engineering Mathematics," KA Stroud . 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 & Physical Sciences
Assessment Results (Pass/Fail)	Yes ☐No ☒

School Assessment Board	Computing, Engineering & Physical Sciences
Moderator	Dr Kenneth Nisbet
External Examiner	C Guiver
Accreditation Details	e.g. ACCA Click or tap here to enter text.
Changes/Version Number	2.14. Changes to Module Coordinator/Moderator Minor changes to wording in Employability Skills etc. Changes to teaching hours subdivision. Assessment vs. Learning Outcomes tidied up. Assessment component title edited to "Coursework" Change to assessment component Coursework LO3, replaced with LO2.

Assessment: (also refer to Assessment Outcomes Grids below)
The module is assessed by a series of coursework exercises, forming one component, and one final unseen exercise forming a second component.
Assessment 1: A series of individual 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 Assignment	√	√		√		50%	0

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