

University of the West of Scotland

Module Descriptor

Session: 2024/25

| Title of Module: Differential Equations 1 | | | |
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| 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 | | | |
| <p>This module introduces differential equations.</p> <p>First and higher order ordinary differential equations are studied.</p> <p>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.</p> <p>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.</p> <p>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.</p> <p>Bespoke mathematical software will be used to study problems in non-routine contexts.</p> <p>The Graduate Attributes relevant to this module are given below:</p> <ul style="list-style-type: none">Academic: Critical thinker; Analytical; Inquiring; Knowledgeable; Problem-solver; Digitally literate; Autonomous.Personal: Motivated; ResilientProfessional: Ambitious; Driven | | | |

| Module Delivery Method | | | | | |
|-------------------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| Face-To-Face | Blended | Fully Online | HybridC | Hybrid 0 | Work-Based Learning |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| See Guidance Note for details. | | | | | |

| Campus(es) for Module Delivery |
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| 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: |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Add name |

| Term(s) for Module Delivery | | | | | |
|---|--------------------------|--------|-------------------------------------|--------|--------------------------|
| (Provided viable student numbers permit). | | | | | |
| Term 1 | <input type="checkbox"/> | Term 2 | <input checked="" type="checkbox"/> | Term 3 | <input type="checkbox"/> |

| 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: | |
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| 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 | |
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| SCQF Headings | During completion of this module, there will be an opportunity to achieve core skills in: |
| Knowledge and Understanding (K and U) | <p>SCQF Level 8</p> <p>Broad knowledge of analytical methods for the solution of differential equations.</p> <p>Ability to demonstrate awareness of the application of differential equations in engineering and science.</p> |
| Practice: Applied Knowledge and Understanding | <p>SCQF Level 8</p> <p>Select and apply a range of routine techniques to obtain solutions to differential equations.</p> <p>Ability to apply a range of methods to conduct investigations in engineering and science.</p> |

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| 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 | |
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| 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 |

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| | Hours Total 200 |
| **Indicative Resources: (e.g. Core text, journals, internet access) | |
| <p>The following materials form essential underpinning for the module content and ultimately for the learning outcomes:</p> <p>"Differential Equations" class notes as published on the University VLE. Suitable bespoke mathematical software.</p> <p>"Engineering Mathematics," KA Stroud .</p> <p>Please ensure the list is kept short and current. Essential resources should be included, broader resources should be kept for module handbooks / Aula VLE.</p> <p>Resources should be listed in Right Harvard referencing style or agreed professional body deviation and in alphabetical order.</p> | |
| (**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 | |
| <p>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.</p> | |
| Equality and Diversity | |
| <p>The University's Equality, Diversity and Human Rights Procedure can be accessed at the following link: UWS Equality, Diversity and Human Rights Code.</p> <p>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..</p> | |
| (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

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| Divisional Programme Board | Engineering & Physical Sciences |
| Assessment Results (Pass/Fail) | Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> |

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| 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 | <p>2.14. Changes to Module Coordinator/Moderator</p> <p>Minor changes to wording in Employability Skills etc.</p> <p>Changes to teaching hours subdivision.</p> <p>Assessment vs. Learning Outcomes tidied up.</p> <p>Assessment component title edited to "Coursework"</p> <p>Change to assessment component Coursework LO3, replaced with LO2.</p> |

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| 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%) |
| <p>(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.</p> <p>(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.)</p> |

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 |

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| Combined Total for All Components | | | | | | 100% | 2 hours |
|--|--|--|--|--|--|-------------|----------------|