MA113-6 Differential Equations A

20/21

Department
Warwick Mathematics Institute
Level
Undergraduate Level 1
Module leader
Scott Balchin
Credit value
6
Module duration
5 weeks
Assessment
Multiple
Study location
University of Warwick main campus, Coventry

Description

Introductory description

An ordinary differential equation (ODE) is a differential equation containing one or more functions of one independent variable and the derivatives of those functions. Many phenemena in applied mathematics, physics and statistics are modelled by such equations, while the theory and practice of ODEs also augments some pure mathematical areas.

Module web page

Module aims

To introduce the basic concepts of ODEs and their solutions. We will use these methods over several interesting examples. Moreover, qualitative analysis of solutions will be discussed.

Outline syllabus

This is an indicative module outline only to give an indication of the sort of topics that may be covered. Actual sessions held may differ.

The module is split into 3 parts. The first part will introduce the basic notions and will then go on to discuss how to solve a wide class of first-order ODEs. The second chapter covers solutions to linear second-order ODEs, in particular we shall apply this theory to a spring system. The final part

of the course will look at coupled systems of ODEs including being able to draw the corresponding phase portraits.

Learning outcomes

By the end of the module, students should be able to:

- At the end, you will be familiar with the notion of ODEs as well as several methods for solving well behaved problems (i.e., first order, second order linear and coupled systems).
- Be able to find both general solutions and particular solutions when provided with the required initial conditions.
- Understand the ideas of the theory of the uniqueness and existence of solutions presented.

Indicative reading list

Everything important in this module can be found in the excellent book, An Introduction to Ordinary Differential Equations, by James Robinson, Cambridge University Press, 2004, ISBN 0 521 53391 0.

Subject specific skills

The module provides technical competence in solving basic ODEs that will allow access to many of the potential applications. One also needs common sense and sometimes out-of-the-box thinking to pick validity of certain models.

Transferable skills

Students will acquire key reasoning and problem solving skills which will empower them to address new problems with confidence.

Study

Study time

Type	Required
Lectures	15 sessions of 1 hour (25%)
Private study	45 hours (75%)
Total	60 hours

Private study description

45 hours of reviewing lectured material and working on set exercises.

Costs

No further costs have been identified for this module.

Assessment

You do not need to pass all assessment components to pass the module.

Assessment group B1

	Weighting	Study time
In-person Examination exam	100%	

- Answerbook Green (8 page)

Assessment group R

	Weighting	Study time
In-person Examination - Resit exam	100%	

- Answerbook Green (8 page)

Feedback on assessment

Coursework and exam feedback.

Past exam papers for MA113

Availability

Courses

This module is Optional for:

- Year 1 of USTA-G300 Undergraduate Master of Mathematics,Operational Research,Statistics and Economics
- Year 1 of USTA-G1G3 Undergraduate Mathematics and Statistics (BSc MMathStat)
- USTA-GG14 Undergraduate Mathematics and Statistics (BSc)

    - Year 1 of GG14 Mathematics and Statistics
    - Year 1 of GG14 Mathematics and Statistics
- USTA-Y602 Undergraduate Mathematics,Operational Research,Statistics and Economics
    - Year 1 of Y602 Mathematics,Operational Research,Stats,Economics
    - Year 1 of Y602 Mathematics,Operational Research,Stats,Economics

This module is Option list B for:

- UCSA-G4G1 Undergraduate Discrete Mathematics
    - Year 1 of G4G1 Discrete Mathematics
    - Year 1 of G4G1 Discrete Mathematics
- Year 1 of UCSA-G4G3 Undergraduate Discrete Mathematics