

Recommended Syllabus

This is the recommended syllabus for the module detailed below. The module should contain all the topics listed below in some form, but be aware that there may be additional material covered that can also be examined.

MA133 Differential Equations

1. FIRST ORDER ORDINARY DIFFERENTIAL EQUATIONS

Trivial first order

Existence and uniqueness

First order linear equations with examples

* Substitution methods

Direction Fields

Autonomous first order ODEs

2. SECOND ORDER ORDINARY DIFFERENTIAL EQUATIONS

General homogeneous equations

Linear second order equations with constant coefficients

Mass/spring systems

Inhomogeneous linear second order equations

Mass/spring systems with forcing

3. INTRODUCTION TO DIFFERENCE EQUATIONS

Motivation (numerical methods)

First order homogeneous linear difference equations

Second order linear equations

First order autonomous nonlinear equations

4. SYSTEMS OF FIRST ORDER LINEAR ODES

In general

Coupled 2x2 linear systems with constant coefficients

Phase portraits and change of variable

Functions of two variables and linearisation

5. DISCUSSION OF FURTHER TOPICS

Three dimensional systems, chaos, nonautonomous second order differential equations