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

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