

This document is under construction, the content is indicative only and subject to change

University of Dundee

Mathematics Division

MA21002: Computer-Algebra and Dynamical Systems Module Guide 2011/ 2012

Introduction

The aim of this new module is to make the students familiar with a Computer Algebra software package and to use this software to solve a number of problems from the area of Dynamical Systems. Computer Algebra systems are nowadays an important tool of applied mathematicians, both in research and industry/business. By making students familiar with such a system at an early stage in the programme we open up a range of applications in other modules which would otherwise not be possible due to the mathematical complexity involved.

Organisation

The MA21002 module is a Level 2 module. In order to take this course you should have passed modules MA11001 and MA12001, or have an equivalent qualification. The Module Leader is Dr Hornig.

You may bring matters of concern about the course to the attention of the Mathematics Division Staff/Student Committee, which meets once each semester. A volunteer from one of the level 2 courses will act as class representative to sit on the Staff–Student Committee; their name will be posted on BlackBoard.

Timetable

The course consists of 55 lectures/workshops. The timetable is available on the websites of the Division of Mathematics and the University.

Your Commitment

You should attend all lectures and workshops except on medical grounds or with the special permission of the lecturer concerned. If you are absent from a Class Test on account of medical problems, you have to submit a medical certificate to the Schools Office immediately.

Study Support

If you are having difficulty with the course work you are encouraged to seek help at an early stage at the Workshops. You may also obtain help your lecturer or your Personal Tutor.

Syllabus

Part 1 : An introduction to Maple

- 1) The Maple front end and syntax
- 2) Plotting
- 3) Integration/differentiation
- 4) Differential equations
- 5) Vectors, Matrices and their operations
- 6) Numerical approximations and errors
- 7) Programming

Part 2 :

Part 2: Introduction to Dynamical Systems

- 1) Newton's laws
- 2) Keplerian motions
- 3) Mathematical Pendulum
- 4) Physical Pendulum/anharmonic oscillator, dynamics in phase space,
- 5) Damped oscillator and driven damped oscillator

Assessment

Assessment: 40% continuous assessment, consisting of 20% for weekly homeworks and 20% for a mid-semester test. The end of term exam counts for 60%.

The Head of Division may debar a student not performing at a satisfactory level in the continuous assessments from entering the Degree Examination.

Feedback

At the end of the module you will be asked to complete a confidential questionnaire regarding the content and presentation of the module. This is an important element in the University's Academic Standards procedures.

Recommended Books

Much of the material for the second part of the course is to be found in

Mechanics

by *R C Smith and P Smith*

Publisher: John Wiley.

Many similar textbooks may be found in the University Library.