

Mathematical Modelling – 8103

Unit Outline 2009 Semester 2

Faculty of Information Sciences and Engineering

University of Canberra

*Australian Government Higher Education (CRICOS)
Registered Provider number: #00212K*

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This Unit Outline must be read in conjunction with:

- a) *Studying at the University of Canberra: A Guide to Policies and Procedures*, which sets out University-wide policies and procedures, including information on matters such as plagiarism, grade descriptors, moderation, feedback and deferred exams, and is available at <http://www.canberra.edu.au/student-services>
- b) *Guide to Student Services at the University of Canberra*, and is available at <http://www.canberra.edu.au/student-services>
- c) Any additional information specified in section 6f.

1: General Information

- 1a Unit title:** Mathematical Modelling
- 1b Unit number:** 8103
- 1c Semester and year offered** Semester 2, 2009
- 1d Credit point value:** 3
- 1e Unit level:** 2
- 1f Name of Unit Convener and contact details (including telephone and email)**
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Name of Unit Moderator and contact details
Dr Ian Lisle Room 11C9 ph: 6201 2389
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- 1g Administrative contact details (including name, location, telephone and email)**
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2: Academic Content

2a Unit description and learning outcomes

The objective of the unit is to introduce students to the mathematics that underlies many scientific disciplines and the calculus requirements for secondary mathematics teachers in the N.S.W. Department of Education. It will also be concerned with the use of key mathematical software such as Maple. Topics included are first and second order differential equations, systems of linear differential equations and an introduction to integral & multivariable calculus. Every effort will be made illustrate the key mathematics by relating it to interesting applications such as predator-prey models of populations, global warming, Newtonian mechanics, spread of infections and related phenomena.

By the end of the unit a successful student will have a grasp of the basic mathematics that is often used in “real world” applications. They will also have developed skill in formulating problems and questions mathematically. Finally, a successful student will develop insight in the art of problem solving; asking the pertinent questions prior to the mathematical formulation of a given “real world” problem and then carrying out appropriate testing and interpretation during and after the mathematical solution process.

2b Prerequisites and/or co-requisites: Mathematical Methods 0577 or its equivalent

3: Delivery of Unit and Timetable

3a Delivery mode

Face-to-face teaching of 3 Lectures and 1 tutorial per week.

Lectures: Monday, 11:30-12:30, 11C43;
13:30-14:30, 11B24,
Wednesday, 10:30-11:30, 11B24,
Tutorial: Wednesday, 15:30-14:30, 11C43

3b Schedule of topics/lectures/tutorials/practicals/field classes by week

Week	Activity
1	Introduction; 2 × Trigonometry;
2	Trigonometry, 2 × Complex Numbers
3	3 × Eigenvalues and Eigenvectors
4	3 × Partial derivatives (multivariable calculus)
5	2 × Partial derivatives (multivariable calculus), Class Test 1
6	3 × Multiple Integrals
7	3 × Multiple Integrals
8	Class Free
9	Class Free

10	3 × Ordinary Differential Equations
11	3 × Ordinary Differential Equations
12	Labour Day, Test 2
13	3 × Ordinary Differential Equations
14	3 × Ordinary Differential Equations
15	2 × Revision

4: Unit Resources

4a Lists of required texts/readings

This is a completely new unit and no single text covers the syllabus in a suitable way. Therefore, I will be recommending reading material as the semester progresses.

4b Materials and equipment

Access to a computer that is running Maple 9.5 or higher

4c Unit website

Moodle learnonline.canberra.edu.au

5: Assessment

5a Assessment overview

Assessment Item (including exams held in the exam period)	Due Date of Assignments	Weighting (total to equal 100%)
Assignment 1	Week 10	10%
Assignment 2	Week 14	15%
Class Test 1	Week 5	15%/20%
Class Test 2	Week 12	20%/15%
Final Exam	Exam Period	40%

5b Details of each assessment item

In each class test you will be permitted to take ½ a side of A4 original handwritten notes and a standard calculator with no alphabetic keypad. For the final exam you will be permitted 1 A4 side of original handwritten notes and a standard calculator with no alphabetic keypad.

Class Tests: If your class test 1 mark is higher than your class test 2 mark then your class test 1 will be scaled to a mark out of 20 and your class test 2 will be scaled to a mark out of 15 to give an overall class test mark out of 35 for the semester. If your class test 1 mark is lower than your class test 2 mark then these weightings will be reversed. In effect, if you do poorly on one of the class tests you have an excellent opportunity to recover in the other.

Assignments: There will be two assignments worth 10% and 15%. They will involve a certain amount of the computer language Maple.

The class test mark, the assignment mark will contribute a mark out of 50; the final exam will contribute a mark out of 50. The class test mark, assignment mark and final exam mark will form your composite score out of 100. The numerical grade for the unit will be based on your composite score and it will be a mark out of 100. Assuming your performance in the final exam is “satisfactory” (see below), then the grade cut-offs for numerical scores will be: Pass 50, Credit 65, Distinction 75, High Distinction 85. That is, grades will be distributed according to the following table.

Grade	Numerical Grade Equivalent
HD	85 and above
DI	75 - 84
CR	65 – 74
P	50 – 64
Fail	0 – 49

5c Special assessment requirements

To gain a passing grade in the unit your overall numerical grade must be above 50% and in addition, your performance in the final exam must be satisfactory. Thus, if you get, for instance, 58% on your continuous assessment and 5 out of 40 on the final exam, you would not pass the unit on the grounds of unsatisfactory final exam performance. Roughly speaking a mark of less than 40% on the final exam would be regarded as unsatisfactory from this point of view.

5d Supplementary assessment

For the University policy on supplementary assessments refer to <http://www.canberra.edu.au/student-services>

If students miss an assessment item due to illness or misadventure and wish to apply for deferred assessment then the unit convenor must be informed within three working days of the missed assessment item. Please refer to the document on the front page of this guide in relation to deferred examinations.

5e Text-matching software

Not relevant to Mathematical Modelling

6: Student Responsibility

6a Workload

The amount of time you will need to spend on study in this Unit will depend on a number of factors including your prior knowledge, learning skill level and learning style. Nevertheless, in planning your time commitments you should note that for a 3cp Unit the total notional workload over the fifteen week semester is assumed to be 150 hours or an average of 10 hours per week. These hours include time spent in classes. The total workload for Units of different credit point value should vary proportionally. For example, for a 6cp Unit the total notional workload over a fifteen week semester is assumed to be 300 hours or an average of 20 hours per week.

6b Special needs

Students who need assistance in undertaking the unit because of disability or other circumstances should inform their Unit Convener or the Disabilities Office as soon as possible so the necessary arrangements can be made.

6c Attendance requirements

Attendance at all classes is assumed.

6d Required IT skills

You should be able to browse the internet and carry out simple tasks such as printing. Though this is not a computer programming unit, you will be required to make use of Maple commands in your assignment and tutorial work. You will not, however, be expected to write programs in Maple.

6e Costs

A suitable non-programmable scientific calculator will be useful. There may be some printing costs.

6f Additional information

Any material posted on the unit website, including announcements, will be deemed to have been received by the whole class. It is your responsibility to ensure that you are fully informed. Also, it is your responsibility to ensure that you bring a working, non-programmable scientific calculator to tests and the final exam. We will not be supplying these and no consideration can be given to those who come to tests without one. Also, it is your responsibility to read email sent to your student account. If you do not read your student account email it is your responsibility to ensure that email to that address is forwarded to an email address that you do read. Once again, if email is sent to your student account I will assume that you've read it. No consideration can be given for unread email.

7: Student Feedback

All students enrolled in this Unit will have an opportunity to provide anonymous feedback on the Unit at the end of the Semester via the Unit Satisfaction Survey which will be presented to you on OSIS. Your lecturer or tutor may also invite you to provide more detailed feedback on their teaching through an anonymous in-class questionnaire administered through the University's Teaching and Learning Centre (TLC).

8: Authority of this Unit Outline
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Any change to the information contained in Section 2 (Academic content), Section 3 (Delivery of Unit and timetable) and Section 5 (Assessment) of this document, will only be made by the Unit Convener if the written agreement of staff and a majority of students has been obtained; and if written advice of the change is then forwarded to each student enrolled in the Unit at their registered term address. Any individual student who believes him/herself to be disadvantaged by a change is encouraged to discuss the matter with the Unit Convener.