THE UNIVERSITY OF SYDNEY
Semester 1, 2009

Information Sheet for **MATH1011 Life Sciences Calculus**

Web Site
It is important that you check the Junior Mathematics web site regularly.
It may be found by following links from the University of Sydney front page, or from WebCT, or by going directly to

`http://www.maths.usyd.edu.au/u/UG/JM/`

Important announcements relating to Junior Mathematics are posted on the site, and there is a link to the MATH1011 page.
The MATH1011 page includes some on-line resources as well as this information sheet. Make sure you look at the MATH1011 page regularly.

Lectures
There are 2 different lecture streams. You should attend one stream (that is, two lectures per week), as shown on your personal timetable.

Times	Location	Lecturer	Consultation
8 a.m. Thu & Fri	Wallace	Dr E Carberry, Carslaw room 723	Wednesdays, 1-2pm
11 a.m. Thu & Fri	Wallace	Weeks 1–6 Mr N Saunders, Carslaw room 530 Weeks 7–13 A/Prof Howlett, Carslaw room 709	Thursdays, 1-2pm in Carslaw 707A Thursdays, 1-2pm

Lectures run for 13 weeks, and the last lecture will be on Friday 5th June.

Tutorials
Tutorials (one per week) start in week 2, EXCEPT for the Friday tutorial, which starts on Friday, 6 March. You should attend the tutorial given on your personal timetable. Attendance at tutorials will be recorded. Your attendance cannot be recorded unless you attend the tutorial in which you are enrolled. Your attendance record will be taken into account in the event that you apply for special consideration at any stage.

Tutorial sheets
The tutorial question sheets for a given week will be available on the MATH1011 web page. **You must print out the current week's tutorial sheet from the web, and take it to your tutorial with you.**
Solutions to tutorial exercises for week n will usually be posted on the web by the afternoon of the Friday of week n.

Assessment
Your final raw mark for this unit will be calculated as follows:

65%:	Exam at end of semester 1.
30%:	Quiz mark.
5%:	Assignment mark.

Your final raw mark is then scaled to produce your final mark. Marks are scaled so that the distribution of grades is consistent with the quality of the class, and the difficulty of the unit, as required by the University.

Examination
There is one examination of 1.5 hours duration during the examination period at the end of semester 1. Further information about the exam will be made available at a later date.

Quizzes
Two quizzes will be held during tutorials, in the **weeks beginning 6 April and 25 May**, EXCEPT for those students in the Friday tutorial, who will have their quiz in the previous week (i.e. **Friday 3 April and Friday 22 May**). Each quiz is worth 15% of your final raw mark. You must sit for the quiz during the tutorial in which you are enrolled. Your quiz mark will not be recorded if you sit for the quiz in a tutorial in which you are not enrolled.

Assignments
One assignment will be marked, and will be worth 5% your final raw mark. The assignment will be due on **Thursday 30 April**. Please see page 26 of the Junior Mathematics Handbook for details relating to the submission of assignments.
Another set of assignment questions will be made available, but these will not be marked, and will not count towards your final mark. Solutions and a marking scheme will be provided, and you are encouraged to mark the questions yourself, or ask a friend to mark it for you (using the marking scheme provided). This will provide you with valuable feedback on how you are handling the material, and help you prepare for the exam.

Text book
Calculus for the Life Sciences (Lecture Notes for MATH1011). School of Mathematics and Statistics, University of Sydney. Available from *KOPYSTOP*.
See the Junior Mathematics Handbook for other references.

Where to go for help
For administrative matters, go to the **Student Office, Carslaw room 520.**
For help with mathematics, see your lecturer, or your tutor. Lecturers guarantee to be available during their indicated office hour, but may well be available at other times as well.

If you are having difficulties with mathematics due to insufficient background, you should go to the Mathematics Learning Centre (Carslaw room 455).

Week-by-week outline

Week	Lecture	Topics
		Functions and Modelling
1	1	Functions and Applications
	2	Functions and Applications (continued)
2	3	Periodicity and sinusoidal functions.
	4	Sinusoidal functions (continued).
3	5	Scaling data: proportionality.
	6	Scaling data: Power laws and log-log transformations.
4	7	Exponential laws and semi-log transformations.
	8	Logarithmic scales.
		Optimisation
5	9	Differentiation. maxima/minima.
	10	Optimisation: critical points
6	11	Optimisation: concavity and points of inflection
	12	Optimisation: applications. Absolute/relative growth rates
7	13	Functions of two variables.
	14	Partial derivatives.
8	15	Maxima and minima of functions of two variables.
	16	Maxima and minima of functions of two variables: applications.
9	17	Maxima and minima of functions of two variables: further applications.
		Integral Calculus
	18	Finite sums.
10	19	The definite integral.
	20	The indefinite integral.
11	21	Integral curves.
	22	Antidifferentiation
12	23	Applications of integration. .
	24	Improper integrals of infinite type.
13	25	Further applications of integration.
	26	Review of the course.

Objectives

This unit aims to illustrate:

- how experimental data, such as that obtained in the life sciences, can be explained by means of elementary functions;
- how the differential and integral calculus can be used to solve problems found in the life sciences;
- the development of an interesting area of mathematics.

Outcomes

Students who successfully complete this unit should be able to:

- fit as appropriate a linear, exponential or a periodic function to a set of experimental data using both calculator and graphical techiques.
- use the differential calculus to solve optimisation problems in one independent variable.
- calculate the partial derivatives of functions of two variables, and hence to solve optimisation problems in two independent variables.
- calculate finite sums and use the sigma notation where appropriate.
- evaluate definite integrals and use definite integrals in applications such as the calculation of areas under curves.
- determine when improper integrals of infinite type exist.