THE UNIVERSITY OF SYDNEY
Semester 1, 2017

Information Sheet for **MATH1111 Introduction to Calculus**

Websites: It is important that you check both the Junior Mathematics website and the MATH1111 website regularly.

Junior Mathematics webpage: `http://www.maths.usyd.edu.au/u/UG/JM/`
MATH1111 webpage: `http://www.maths.usyd.edu.au/u/UG/JM/MATH1111`

Both sites may be accessed through the Learning Management System (Blackboard):

`https://elearning.sydney.edu.au`.

Important announcements relating to Junior Mathematics are posted on the Junior Mathematics page. On the MATH1111 page you will find online resources and other useful links. Announcements regarding assessment tasks will be made on this page at various times throughout the semester.

Lectures:

Times	Location	Lecturer
4–5 pm Wed, Weeks 1–13	Merewether LT 1 (Room 131)	A/Prof David Easdown
5–6 pm Wed, Week 8	Merewether LT 1 (Room 131)	
3–5 pm Fri, Weeks 1–5 & 7–13	Eastern Avenue Auditorium	

Lectures run for 13 weeks. The first lecture will be on Wednesday 8 March. The last lecture will be on Friday 9 June.

Consultation times: Consultation times will be posted on the MATH1111 webpage.

Tutorials: You should attend two tutorials per week, starting in Week 2, as shown on your personal timetable. One tutorial will be on Monday or Tuesday, in the form of a practice class, and the second tutorial will be on Thursday or Friday. Please note, however, that there will be no classes on Good Friday (14 April). Attendance at tutorials is recorded. Your attendance will not be recorded unless you attend the tutorial in which you are enrolled.

Tutorial sheets: The tutorial exercise sheets will be available from the MATH1111 webpage. Solutions to tutorial exercises for any given week will normally be posted later that week or early the following week.

Textbook: Anton, Bivens and Davis. *Calculus Early Transcendentals Single Variable*. 10th edition, Wiley, 2012. Available from the Co-op Bookshop.

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

60%: Exam at end of Semester 1.
20%: Online homework exercises.
10%: Mid-semester test (using the better mark principle).
5%: Assignment 1 mark.
5%: Assignment 2 mark.

The *better mark principle* means that for the mid-semester test, the test counts if and only if it is better than or equal to your exam mark. If your test mark is less than your exam mark, the exam mark will be used for that portion of your assessment instead. The assignment marks count for 10% regardless of whether they are better than your exam mark or not.

Final grades are returned within one of the following bands:

> **High Distinction (HD), 85–100:** representing complete or close to complete mastery of the material; **Distinction (D), 75–84:** representing excellence, but substantially less than complete mastery; **Credit (CR), 65–74:** representing a creditable performance that goes beyond routine knowledge and understanding, but less than excellence; **Pass (P), 50–64:** representing at least routine knowledge and understanding over a spectrum of topics and important ideas and concepts in the course.

A student with a passing or higher grade should be well prepared to undertake further studies in mathematics or statistics. Students hoping to take *MATH1013 Mathematical Modelling* in second semester should be aiming to achieve a credit or higher grade in MATH1111.

Examination: There is one examination of 2 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 on the website.

Assignments: There are two assignments, which must be submitted electronically, **as PDF files only**, in Turnitin (an internet-based plagiarism-prevention service), via the Learning Management System (Blackboard) website by the deadline. Note that your assignment will not be marked if it is illegible or if it is submitted sideways or upside down. It is your responsibility to check that your assignment has been submitted correctly.

Mid-semester test: The mid-semester test, worth 10%, will be held in the lecture on Wednesday 3 May (Week 8). It will consist of multiple choice questions and last 40 minutes. Further information about the test, topics to be covered and practice questions will be distributed about two weeks before the quiz is held.

Online formative assessments: A series of online homework exercises have been set using the learning system *MyMathLab Global*. These exercises are self-paced and allow multiple attempts, so that a diligent student may be able to progressively master all of them. Alternative optional online homeworks have been set using *Wiley Plus*, the learning system associated with the textbook (see below), and are accessible through Blackboard. If a student opts not to complete online homework exercises, for any reason, then credit will be transferred to other components of the assessment.

Assessment and feedback schedule:

Task	**Available**	**Deadline/date**	**Latest extension***	**Feedback**
Assignment 1	Mon 27 Mar	11:59 pm Thu 6 Apr	11:59 pm Thu 13 Apr	9 am Mon 24 Apr
Mid-semester test		Wed 3 May (Week 8)	4 pm Tue 9 May	Wed 10 May (Week 9)
Assignment 2	Mon 8 May	11:59 pm Thu 18 May	11:59 pm Thu 25 May	9 am Mon 29 May
Online homework	6 Mar	5 pm Fri 16 Jun		

* Extensions for assignments are only possible for students registered with Disability Services or applying for Special Consideration or Special Arrangements.

Special consideration and special arrangements: While studying at the University of Sydney, you may need to apply for special consideration or special arrangements as follows:

> Special consideration may be granted to students where well-attested illness, injury, or misadventure occurs to them (or someone they have carer's responsibility for) during the semester or the exam period. Special arrangements may be granted for essential community commitments. Further information on eligibility, document requirements, and how to apply is available at `http://sydney.edu.au/science/cstudent/ug/forms.shtml#special_consideration`. Applications must be made using the University's formal application process.

Final examinations will be held in the formal examination period. Students affected by illness, injury or misadventure may lodge a request for Special Consideration to sit a replacement examination in the formal Replacement Examination period (week 18).

If you are registered with Disability Services and would like to have adjustments applied to the replacement examination, you are required to amend your Academic Plan with Disability Services specifically for this replacement examination. This needs to be done as soon as you are notified of award of the replacement opportunity. If you have not done so, you will be allowed to sit the replacement, but under unadjusted conditions.

You should *not* submit an application of either type

- if you are absent from a tutorial and there is no assessment associated with the missed tutorial.

The assessment category for the assignments is "Submitted Work".

Any questions? Before you contact us with any enquiry, please check the FAQ page:

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

Where to go for help: For administrative matters, go to the *Student Services Office, Carslaw 520*. For help with mathematics, see your lecturer, your tutor, a duty tutor, or use the Ed discussion forum (`https://edstem.com.au`). Lecturers guarantee to be available during their indicated office hours, but may be available at other times as well. If you are having difficulties with mathematics due to insufficient background, you may seek help from the *Mathematics Learning Centre, Carslaw 177*. You may also email questions about the subject to `MATH1111@maths.usyd.edu.au`. Ensure that any emails that you send to this address contain your name and SID, because anonymous emails will be ignored.

Aims and learning outcomes: The discovery of calculus, independently by Newton and Leibniz, in the 17th century, was one of the most profound and influential human intellectual achievements of all time, setting off chain reactions of scientific progress and developments that continue to accelerate into the 21st century. (See, for example, the article by Ron Sandland (23/02/2013), entitled *Mathematics. Trust Me. It's important*:

`http://www.abc.net.au/science/articles/2013/01/23/3674843.htm`.

Calculus and its ramifications form the backbone of almost all applications of mathematics to physical and biological sciences and engineering. Students taking *MATH1111 Introduction to Calculus* will experience all of the key ideas and ingredients of calculus and start to see clearly how differential and integral calculus fit together and how they are applied to solve problems. They will develop sufficient fluency and mathematical literacy to undertake further studies in mathematics and statistics. They will have taken the first important steps to becoming confident users and interpreters of calculus in their own scientific disciplines. At the same time, students will start to gain an appreciation of the power, unity and beauty of mathematics that evolved over thousands of years, yet is indispensable to our modern way of life.

By the end of the semester, students should be able to:

- apply mathematical logic and rigour to solving problems, and express mathematical ideas coherently in written and oral form;
- demonstrate fluency in manipulating real numbers, their symbolic representations, operations, and solve associated algebraic equations and inequalities;
- develop fluency with lines, coordinate geometry in two dimensions, the notion of a function, its natural domain, range and graph;
- become conversant with elementary functions, including trigonometric, exponential, logarithmic and hyperbolic functions and be able to apply them to real phenomena and to yield solutions of associated equations;
- perform operations on functions and be able to invert functions where appropriate;

- understand the definitions of a derivative, definite and indefinite integral and be able to apply the definitions to elementary functions;
- develop fluency in rules of differentiation, such as the product, quotient and chain rules, and use them to differentiate complicated functions;
- understand and apply the Fundamental Theorem of Calculus; and develop fluency in techniques of integration, such as integration by substitution, the method of partial fractions and integration by parts;
- develop some fluency with coordinate geometry in three dimensions, planes, surfaces, ellipsoids, paraboloids, level curves and qualitative features such as peaks, troughs and saddle points.

Proposed week-by-week outline:

Week	**Topics**
1	Number systems, equations, and the Theorem of Pythagoras. The real number line, inequalities and intervals.
2	Coordinate geometry in the real plane, lines, and curves. Quadratics and polynomials.
3	Functions, their graphs, and operations on functions. Inverse functions and review of trigonometry.
4	Exponential functions, logarithms, exponential growth and decay. Introduction to hyperbolic functions.*
5	Introduction to coordinate geometry in space. Spheres and paraboloids.* Planes, surfaces, level curves, peaks, troughs and saddles.*
6	Limits, tangent lines, speed, and acceleration. Derivatives and simple properties.
7	Leibniz notation and common derivatives. Differentials and applications.
8	**Mid-semester Test, Wednesday 3 May.** Product, Quotient and Chain Rules.
9	Applications of 1st and 2nd derivatives. Optimisation. Limits, asymptotes and curve sketching.
10	Areas under curves. Relationship between velocity and distance. Definite integrals and simple properties.
11	Antidifferentiation and the Fundamental Theorem of Calculus. Indefinite integrals.
12	Integration by substitution. Introduction to advanced methods: partial fractions and integration by parts.*
13	Introduction to improper integrals.* Introduction to calculus of curves and surfaces in space.* Revision.

* Including self-paced project work suitable for students aiming for distinctions or high distinctions.