THE UNIVERSITY OF SYDNEY
Semester 1, 2017

Information Sheet for **MATH1001 Differential Calculus**

Websites: It is important that you check both the Junior Mathematics website and the MATH1001 website regularly.

Junior Mathematics webpage: `http://www.maths.usyd.edu.au/u/UG/JM/`
MATH1001 webpage: `http://www.maths.usyd.edu.au/u/UG/JM/MATH1001`

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 MATH1001 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: There are 5 different lecture streams. You should attend one stream (that is, two lectures per week), as shown on your personal timetable.

Times	Location	Lecturer
8 am Thu & Fri	Wallace	Haotian Wu
8 am Thu & Fri	Carslaw 159	Fernando Viera/Danya Rose
11 am Thu & Fri	Wallace	Joachim Worthington/Marek Rutkowski
11 am Thu & Fri	E Ave Aud	Eduardo Altmann
11am Thu 11am Fri	Carslaw 157 Carslaw 159	Adrianne Jenner/Ross Ogilvie

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

Consultation times: Consultation times will be posted on the MATH1001 webpage.

Tutorials: Tutorials (one per week) start in Week 2. You should attend the tutorial given on your personal timetable. Attendance at tutorials will be recorded. Your attendance will not be recorded unless you attend the tutorial in which you are enrolled.

Tutorial and exercise sheets: The question sheets for a given week will be available on the MATH1001 webpage. Solutions to tutorial exercises for week n will usually be posted on the web by the afternoon of the Friday of week n.

Course notes: *Course Notes for MATH1001 Differential Calculus* are available for purchase from Kopystop, 55 Mountain St, Broadway. See the Junior Mathematics Handbook for other useful references.

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

65%:	Exam at end of Semester 1.
15%:	Quiz 1 mark (using the better mark principle).
15%:	Quiz 2 mark (using the better mark principle).
2.5%:	Assignment 1 mark.
2.5%:	Assignment 2 mark.

The *better mark principle* means that for each quiz, the quiz counts if and only if it is better than or equal to your exam mark. If your quiz mark is less than your exam mark, the exam mark will be used for that portion of your assessment instead. For example, if your quiz 1 mark is better than your exam mark while your quiz 2 mark is worse than your exam mark, then the exam will count for 80%, quiz 1 will count for 15%, and the assignments will count for 5% of your overall mark. The assignment marks count for 5% 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 which are dependent on this unit of study. A student achieving a distinction or higher grade should consider enrolling in advanced units in second semester.

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 on the website.

Quizzes: Quizzes will be held during tutorials. You must sit for the quiz during the tutorial in which you are enrolled, unless you have a Permission Slip from the Student Services Office, issued only for verifiable reasons. Otherwise, your quiz mark may not be recorded.

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.

Assessment and feedback schedule:

Task	**Available**	**Deadline/date**	**Latest extension***	**Feedback**
Assignment 1	Mon 13 Mar	11:59 pm Thu 23 Mar	11:59 pm Thu 30 Mar	9 am Mon 3 Apr
Quiz 1		10–12 Apr (Week 6)		24 & 26 Apr, 2 May (Weeks 7–8)
Assignment 2	Mon 24 Apr	11:59 pm Thu 4 May	11:59 pm Thu 11 May	9 am Mon 15 May
Quiz 2		29–31 May (Week 12)		5–7 Jun (Week 13)

* 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.
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> 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).
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> 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, or
- if you miss a quiz, since the better mark principle applies.

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 `MATH1001@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.

Objectives: The objectives of this unit are to:

- introduce the concept of a complex number;
- consolidate your understanding of functions of one variable, limits and continuity;
- illustrate the mathematical description of curves and surfaces in space;
- introduce functions of two variables and partial derivatives;
- introduce Taylor polynomials and Taylor series;
- improve your ability to think logically, analytically, and abstractly;
- enhance your problem-solving skills.

In addition, this unit provides students with a solid foundation for further studies in mathematics and/or other scientific disciplines.

Outcomes: Students who successfully complete this unit will be able to demonstrate competency in:

- applying mathematical logic and rigour to solving problems;
- reading and writing basic set notation;
- arithmetic operations with complex numbers in Cartesian, polar, and exponential form;
- using de Moivre's theorem to find powers and roots of complex numbers;
- solving simple polynomial equations involving complex numbers;
- interpreting geometrically certain algebraic expressions as curves and surfaces;
- calculating partial derivatives;
- finding equations of planes tangent to surfaces;
- finding critical points of functions of one and two variables;
- using the differential of a function in practical problems;
- calculating the directional derivative and the gradient vector for a function of two variables;
- interpreting the directional derivative and the gradient vector geometrically;
- applying an intuitive understanding of a limit and knowledge of basic limit laws to calculate the limits of functions;

- using L'Hôpital's rule;
- finding inverse functions;
- finding Taylor polynomials and the Taylor series expansion of a function;
- expressing mathematical ideas and arguments coherently in written form.

Proposed week-by-week outline:

Week	**Topics**
1	Set notation, the real number line. Complex numbers in cartesian form. Complex plane, modulus.
2	Complex numbers in polar form. De Moivre's Theorem. Complex powers and nth roots.
3	Definition of $e^{i\theta}$ and e^z for z complex. Applications to trigonometry. Revision of domain and range of a function.
4	Working in $\mathbb{R}^3$. Curves and surfaces. Functions of 2 variables. Level curves.
5	Partial derivatives and tangent planes. The derivative as a difference quotient. Geometric significance of the derivative. Discussion of limit.
6	Higher order partial derivatives. Limits of $f(x, y)$. Continuity.
7	Maxima and minima of $f(x, y)$.
8	The chain rule. Implicit differentiation.
9	Directional derivatives and the gradient.
10	Limit laws, l'Hôpital's rule, composition law. Definition of sinh and cosh and their inverses.
11	Taylor polynomials. The remainder term.
12	Taylor series.
13	Revision.