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Information Sheet for **MATH1001 Differential Calculus**

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

Junior Mathematics webpage: <http://sydney.edu.au/science/math/s/u/UG/JM/>  
MATH1001 webpage: <http://sydney.edu.au/science/math/s/u/UG/JM/MATH1001>

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

<https://canvas.sydney.edu.au/courses/6729>.

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 is one lecture stream.

Times	Location	Lecturer
8 am Thu & Fri	Carslaw 159	Professor Anthony Henderson

Lectures run for 13 weeks. The first lecture will be on Thursday 8 March. The last lecture will be on Friday 8 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:** Pre-tutorial exercises, for you to do out of class time, will be posted on the MATH1001 webpage in the week before each tutorial. The tutorial exercises will be handed out in your tutorial. Solutions will be posted once all the tutorials for the week are complete.

**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 (Canvas) 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 12 Mar	11:59 pm Thu 22 Mar	11:59 pm Thu 29 Mar	9 am Mon 9 Apr
Quiz 1		16–18 Apr (Week 6)		23 & 24 Apr, 2 May (Weeks 7–8)
Assignment 2	Mon 23 Apr	11:59 pm Thu 3 May	11:59 pm Thu 10 May	9 am Mon 14 May
Quiz 2		28–30 May (Week 12)		4–6 Jun (Week 13)

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

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

<http://sydney.edu.au/science/math/su/UG/JM/FAQ.html>.

**Where to go for help:** For administrative matters, go to the *Student Services Office, Carlaw 520*. For help with mathematics, see your lecturer, your tutor, or use the Ed discussion forum (<https://edstem.org>). 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, Carlaw 177*. You may also email questions about the subject to [MATH1001@sydney.edu.au](mailto:MATH1001@sydney.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 $n$ th 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.

## ADDITIONAL INFORMATION

**Attendance:** Unless otherwise indicated, students are expected to attend a minimum of 80% of timetabled activities for a unit of study, unless granted exemption by the Associate Dean.

For some units of study the minimum attendance requirement, as specified in the relevant table of units or the unit of study outline, may be greater than 80%.

The Associate Dean may determine that a student has failed a unit of study because of inadequate attendance.

Further details are available from the Science Undergraduate Handbook 2018: [http://sydney.edu.au/handbooks/science/coursework/faculty\\_resolutions.shtml](http://sydney.edu.au/handbooks/science/coursework/faculty_resolutions.shtml) and the Science Postgraduate Handbook 2018: [http://sydney.edu.au/handbooks/science\\_PG](http://sydney.edu.au/handbooks/science_PG).

**Online Components:** This unit of study requires regular use of the University's Learning Management System (LMS). This could be either Blackboard or Canvas. Internet access is required to use the LMS.

**Assessment Submission:** Assessment tasks must be submitted by the due date. Submission will be online through the LMS unless instructed otherwise.

**Compliance Statement** All students must submit a signed statement of compliance with each piece of work submitted to the University for assessment, presentation or publication. A statement of compliance certifies that no part of the work constitutes a breach of the Academic Honesty in Coursework Policy 2015: <https://sydney.edu.au/policies/showdoc.aspx?recnum=PD0C2012/254&RendNum=0>.

This will be completed as part of the Turnitin assignment submission.

**Late Submissions** Work not submitted by the due date is not accepted.

**Academic Dishonesty and Plagiarism** Academic honesty is a core value of the University. Therefore, all students are required to act honestly, ethically and with integrity. Academic dishonesty is defined as any dishonest or unfair action taken in order to gain academic advantage. It also includes knowingly assisting another student to do this.

The University will not tolerate academic dishonesty or plagiarism, and will treat all allegations of academic dishonesty and plagiarism seriously.

Plagiarism is defined as presenting another persons work as ones own by presenting, copying or reproducing it without appropriate acknowledgement of the source.

Plagiarism includes presenting work for assessment, publication, or otherwise, that includes:

- a. phrases, clauses, sentences, paragraphs or longer extracts from published or unpublished work (including from the internet) without appropriate acknowledgement of the source; or
- b. the work of another person, without appropriate acknowledgement of the source and in a way that exceeds the boundaries of legitimate co-operation.

Further information is available in the Academic Honesty in Coursework Policy 2015: <https://sydney.edu.au/policies/showdoc.aspx?recnum=PD0C2012/254&RendNum=0>.

**Similarity Detection Software** Students should be aware that the University has authorised and mandated the use of the text-based similarity detecting software called Turnitin for all text-based written assignments. Turnitin searches for matches between text in your written assessment task and text sourced from the Internet, published works, and assignments that have previously been submitted for analysis. Further information regarding plagiarism detection is available in the Academic Honesty in Coursework Policy 2015: <https://sydney.edu.au/policies/showdoc.aspx?recnum=PD0C2012/254&RendNum=0>.

**Academic Honesty Education Module (AHM)** All students commencing their study at the University of Sydney are required to complete the Academic Honesty Education Module. You will find the AHM in your Learning Management System.

**Special Consideration** In the event of serious illness or misadventure which affects your preparation or performance in an assessment task, you may be eligible for Special Consideration. Further information is available at: <https://sydney.edu.au/students/special-consideration-and-arrangements.html>. You should *not* submit an application for Special Consideration or Special Arrangements for this unit of study

- 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”.

**Student Feedback:** The Unit of Study Survey

At the completion of each Unit of Study, students are asked via email to complete an online survey to provide feedback on their experiences in that Unit of Study. This feedback is invaluable when reviewing curriculum design and implementation styles.

**University Work, Health and Safety Policy:** We are governed by the Work Health and Safety Act 2011, Work Health and Safety Regulation 2011 and Codes of Practice. Penalties for non-compliance have increased. Everyone has a responsibility for health and safety at work. The University’s Work Health and Safety policy explains the responsibilities and expectations of workers and others, and the procedures for managing WHS risks associated with University activities.

**General Laboratory Safety Rules**

- No eating or drinking is allowed in any laboratory under any circumstances
- A laboratory coat and closed-toe shoes are mandatory
- Follow safety instructions in your manual and posted in laboratories
- In case of fire, follow instructions posted outside the laboratory door
- First aid kits, eye wash and fire extinguishers are located in or immediately outside each laboratory

As a precautionary measure, it is recommended that you have a current tetanus immunisation. This can be obtained from University Health Service (<http://www.unihealth.usyd.edu.au/>).

For more details please refer to Emergencies and safety on campus: <https://sydney.edu.au/students/emergencies-and-safety-on-campus.html>

**Student Support Services:**

A guide for new students:

<https://sydney.edu.au/students/browse.html?category=new-students&topic=getting-started>

Counselling and mental health support:

<https://sydney.edu.au/students/counselling-and-mental-health-support.html>

Disability Support:

<https://sydney.edu.au/students/disability-support.html>

International Student Support:

<https://sydney.edu.au/students/support-for-international-students.html>

Learning Services / Study Skills Support:

<https://sydney.edu.au/students/learning-services.html>

Student IT and online learning:

<https://sydney.edu.au/students/browse.html?category=student-it-and-online-learning&topic=online-learning>

Academic Writing:

<https://sydney.edu.au/students/writing.html>