THE UNIVERSITY OF SYDNEY
Semester 1, 2018

Information Sheet for **MATH1921 Calculus of One Variable (Advanced)**

Websites: It is important that you check both the Junior Mathematics website and the MATH1921 website regularly.

Junior Mathematics webpage: `http://sydney.edu.au/science/maths/u/UG/JM/`
MATH1901 webpage: `http://sydney.edu.au/science/maths/u/UG/JM/MATH1921`

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

`https://canvas.sydney.edu.au/courses/1935.`

Important announcements relating to Junior Mathematics are posted on the Junior Mathematics page. On the MATH1921 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
8 am Thu, Weeks 1–13	ABS Auditorium (B2010)	A/Prof Daniel Daners
8 am Fri, Weeks 1–3 & 5–13	ABS Auditorium (B2010)	

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 MATH1921 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.

Tutorial and exercise sheets: Pre-tutorial exercises, for you to do out of class time, will be posted on the MATH1921 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: Will be provided week by week.

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

70%:	Exam at end of Semester 1.
10%:	Quiz 1 mark (using the better mark principle).
10%:	Quiz 2 mark (using the better mark principle).
5%:	Assignment 1 mark.
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 10%, and the assignments will count for 10% of your overall mark. 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. Students intending to continue with further advanced units of study should be aiming to obtain a credit or higher.

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 text matching service to detect possible plagiarism), via the online Learning Management System (Canvas) 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[1]	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		23 & 26 Apr (Week 7)		30 April & 3 May (Week 8)
Assignment 2	Mon 30 April	11:59 pm Thu 10 May	11:59 pm Thu 17 May	9 am Mon 21 May
Quiz 2		28 & 31 May (Week 12)		4 & 7 Jun (Week 13)

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[1]**Note:** 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/maths/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, 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. You may also email questions about the subject to MATH1921@sydney.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: *MATH1921 Calculus of One Variable (Advanced)* is the beginning of a natural hierarchy of mathematics units of study, the first continuation being *MATH1923 Multivariable Calculus and Modelling (Advanced)* in Semester 2, followed by advanced units in the intermediate year, which also build upon *MATH1902 Linear Algebra (Advanced)*. The unit of study begins with a discussion of complex numbers. In particular an in depth discussion of the complex exponential function will be provided. Next, the familiar terminology for functions gets an upgrade. Then the main theme of the unit is introduced, namely, the concept of a limit. Limits will be treated rigorously (the "epsilon-delta" definition), and rules will be developed to allow the to calculate and manipulate limits. With the concept of limit in place, one can now study functions with nice properties such as continuity or differentiability, and derive consequences of these properties. In particular, a strong form of l'Hôpital's rule for calculating certain types of limits will be proved. The next part of the unit deals with the powerful theory of Taylor polynomials and Taylor series of standard functions. The final part of the unit introduces the Riemann integral via Riemann sums. Application of Riemann sums include the derivation of formulas for arc length, volumes and surfaces of revolution. The theory of integrals and derivatives is then provided via the Fundamental Theorem of Calculus. The final part of the unit is a discussion of integration methods and improper integrals.

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 complex numbers, functions of one or more variables, inverse functions, limits, derivatives, maxima and minima, and polynomial approximations;
- understand and know how to use the theorems that apply specifically to continuous functions (intermediate value theorem, extreme value theorem) and to differentiable functions (chain rule, Rolle's theorem, mean value theorem, l'Hôpital's rule)
- understand and be able to work with Taylor polynomial, remainder estimates and Taylor series;
- appreciate the significance of integral calculus, and in particular appreciate the powerful interplay between integral and differential calculus via the Fundamental Theorem of Calculus;
- apply integration methods including integration by substitution, integration by parts partial fractions proficiently without too much quidance.
- Be able to derive and use the formulas for arc length, volumes of revolution and surface area of revolution.
- be able to deal with improper integrals, including the use of comparison theorems.

Proposed week-by-week outline:

Week	Topics
1	Complex numbers in Cartesian and polar form. Complex powers and De Moivre's Theorem.
2	nth roots. The complex exponential function. Representing complex functions.
3	Injective and bijective functions. Inverse functions. Hyperbolic functions.
4	Limits and the limit laws.
5	Continuity. Intermediate Value Theorem.
6	Differentiability. Rolle's Theorem and the Mean Value Theorem.
7	Cauchy's Mean Value Theorem and L'Hôpital's Rule.
8	Taylor polynomials with remainder, Taylor series of standard functions
9	Evaluation of Riemann sums. Definition of the Riemann integral.
10	Fundamental Theorem of Calculus. Functions defined by integrals.
11	Applications of Riemann sums and integrals: volumes, arc lengths, volumes of revolution, surface area of revolution.
12	Improper integrals Integrals of unbounded functions. Integrals over unbounded intervals. Comparison tests. p-integrals.
13	Revision / Spill-over

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
and the Science Postgraduate Handbook 2018:
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=PDOC2012/254&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=PDOC2012/254&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=PDOC2012/254&RendNum=0`.

Academic Honesty Education Module (AHEM)   All students commencing their study at the University of Sydney are required to complete the Academic Honesty Education Module. You will find the AHEM 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