THE UNIVERSITY OF SYDNEY
Semester 2, 2018

Information Sheet for **MATH1923 Multivariable Calculus and Modelling (Advanced)**

Websites: It is important that you check both the Junior Mathematics website and the MATH1923 website regularly.

Junior Mathematics webpage: `http://sydney.edu.au/science/maths/u/UG/JM/`
MATH1923 webpage: `http://sydney.edu.au/science/maths/u/UG/JM/MATH1923`

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

`https://canvas.sydney.edu.au/courses/6232`.

Important announcements relating to Junior Mathematics are posted on the Junior Mathematics page. On the MATH1923 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. You should attend two lectures per week, as shown on your personal timetable.

Times	Location	Lecturer	Office
8am Thu & Fri	ABS B2010	James Parkinson	Carslaw 614

Lectures run for 13 weeks. The first lecture will be on Thursday 2 August. The last lecture will be on Friday 2 November.

Consultation times: Consultation times will be posted on the MATH1923 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 MATH1923 webpage. Solutions to tutorial exercises for week n will usually be posted on the web by the afternoon of the Friday of week n.

Reference book: James Stewart. *Calculus*. Cengage Learning. 7th Edition, International Edition, 2012, ISBN 978-0-538-49884-5 or 8th Edition, Metric Version, 2015, ISBN 978-1-305-26672-8. Available from the Co-op Bookshop.

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

70%: Exam at end of Semester 2.
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 which are dependent on this unit of study.

Examination: There is one examination of 1.5 hours' duration during the examination period at the end of Semester 2. 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 permission from the Student Services Office, issued only for verifiable reasons. Otherwise, your quiz mark may not be recorded. Quizzes will only be returned in the tutorial you sat the quiz and must be collected by week 13.

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 (check that you can view each page). Late submisions will receive a mark of zero.

Assessment and feedback schedule:

Task	**Available**	**Deadline/date**	**Latest extension***	**Feedback**
Assignment 1	Mon 6 Aug	11:59 pm Thu 16 Aug	11:59 pm Thu 23 Aug	9 am Mon 27 Aug
Quiz 1		4 Sep (Week 6) 6 Sep (SSP)		11 & 13 Sep (Week 7)
Assignment 2	Mon 17 Sep	11:59 pm Thu 4 Oct	11:59 pm Thu 11 Oct	9 am Mon 15 Oct
Quiz 2		16 Oct (Week 11) 18 Oct (SSP)		23 & 25 Oct (Week 12)

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

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. 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 `MATH1923@sydney.edu.au`. Ensure that any emails that you send to this address contain your name and SID, because anonymous emails will be ignored.

Unit description: Calculus is a discipline of mathematics that finds profound applications in science, engineering, and economics. This unit investigates multivariable differential calculus and modelling. Emphasis is given both to the theoretical and foundational aspects of the subject, as well as developing the valuable skill of applying the mathematical theory to solve practical problems. Topics covered in this unit of study include mathematical modelling, first-order differential equations, second-order differential equations, systems of linear equations, visualisation in 2 and 3 dimensions, partial derivatives, directional derivatives, the gradient vector, and optimisation for functions of more than one variable. Additional topics covered in this advanced unit of study include the use of diagonalisation of matrices to study systems of linear equation and optimisation problems, limits of functions of two or more variables, and the derivative of a function of two or more variables.

Proposed week-by-week outline:

Week	Topics
1	Introduction to models
2	First-order differential equations
3	Integrating factors and direction fields
4	Second-order differential equations, boundary conditions
5	Systems of linear differential equations, interpretation through diagonalisation, introduction to phase plane analysis
6	Functions of more than one real variable
7	Limits of functions of more than one real variable
8	Partial derivatives, tangent planes, linear approximation
9	Directional derivatives, gradient vector, and applications
10	Chain rule, implicit differentiation
11	Optimising functions of two or more variables
12	Further optimisation and interpretation using diagonalisation
13	Revision/further applications

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

- applying mathematical logic and rigour to solving problems;
- expressing mathematical ideas and arguments coherently in written form;
- setting up differential equations which arise from mathematical models of interest to scientists and engineers;
- understand the relationship between a first-order differential equation, its direction field, and its solution curves;
- solve separable and first-order linear differential equations;
- solve second-order homogeneous linear differential equations with constant coefficients;
- calculate partial derivatives and understand their geometric significance;
- finding equations of tangent planes to surfaces;
- optimisation of functions of two or more variables;
- calculating the direction derivative and gradient vector, and understanding their physical significance;
- understanding the connections between multivariable calculus and linear algebra;
- understanding the concepts of limit and derivative for functions of more than one variable.

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 person's work as one's 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