MAST10005 Calculus 1

Credit Points:	12.5
Level:	1 (Undergraduate)
Dates & Locations:	2015, Parkville This subject commences in the following study period/s: Semester 1, Parkville - Taught on campus. Semester 2, Parkville - Taught on campus.
Time Commitment:	Contact Hours: 3 x one hour lectures per week, 1 x one hour practice class per week. Total Time Commitment: Estimated total time commitment of 170 hours
Prerequisites:	Study score of 25 or more in VCE Mathematical Methods 3/4 or equivalent, or

Subject	Study Period Commencement:	Credit Points:
MAST10012 Introduction to Mathematics	Summer Term, Semester 1	12.50

Corequisites:	None
Recommended Background Knowledge:	None
Non Allowed Subjects:	Students who have completed any of the following may not enrol in this subject for credit: # MAST10006 Calculus 2 # MAST10008 Accelerated Mathematics 1 # MAST10009 Accelerated Mathematics 2 # MAST10013 UMEP Maths for High Achieving Students Students may not enrol in MAST10005 Calculus 1 and MAST10006 Calculus 2 concurrently. Students with a study score of 30 or more in VCE Specialist Mathematics 3/4 or equivalent, may not enrol in this subject for credit. Bachelor of Science students are permitted to complete a maximum of three level-1 Mathematics and Statistics subjects. They are not permitted to complete all four of MAST10005, MAST10006, MAST10007 and MAST10010
Core Participation Requirements:	For the purposes of considering request for Reasonable Adjustments under the Disability Standards for Education (Cwth 2005), and Student Support and Engagement Policy, academic requirements for this subject are articulated in the Subject Overview, Learning Outcomes, Assessment and Generic Skills sections of this entry. It is University policy to take all reasonable steps to minimise the impact of disability upon academic study, and reasonable adjustments will be made to enhance a student's participation in the University's programs. Students who feel their disability may impact on meeting the requirements of this subject are encouraged to discuss this matter with a Faculty Student Adviser and Student Equity and Disability Support: http://services.unimelb.edu.au/disability
Coordinator:	Assoc Prof Deborah King, Dr Alexandru Ghitza
Contact:	First Year Coordinator **Email: fycoord@ms.unimelb.edu.au (mailto:fycoord@ms.unimelb.edu.au)**
Subject Overview:	This subject extends students' knowledge of functions and calculus and introduces them to the topics of vectors and complex numbers. Students will be introduced to new functions such as the inverse trigonometric functions and learn how to extend the techniques of differentiation to these. Integration techniques will be applied to solving first order differential equations.

	Differential calculus: graphs of functions of one variable, trigonometric functions and their inverses, derivatives of inverse trigonometric functions, implicit differentiation, related rates. Integral calculus: integration by trigonometric and algebraic substitutions and partial fractions with application to areas and volumes. Ordinary differential equations: solution of simple first order differential equations arising from applications such as population modelling. Vectors: dot product, scalar and vector projections, plane curves specified by vector equations. Complex numbers: arithmetic of complex numbers, sketching regions in the complex plane, De Moivre's Theorem, roots of polynomials, the Fundamental Theorem of Algebra.
Learning Outcomes:	Students completing this subject should: # be able to graphically represent and analyse key features of polynomial, circular, inverse circular and reciprocal functions and relations representing circles, simple ellipses and hyperbolas; # be able to manipulate simple trigonometric identities and compound and double angle formulas for sine, cosine and tangent; # understand the arithmetic of vectors in two and three dimensions, linear independence, scalar product and application to vector projections and resolutes, plane curves specified parametrically by a vector equation and determination of corresponding cartesian equations; # extend differentiation techniques to implicit differentiation, derivatives of inverse circular functions, second and higher order derivatives and be able to apply these to curve sketching and related rates problems; # be able to evaluate integrals using algebraic and trigonometric substitutions, and simple partial fractions; # be able to apply integration techniques to the calculation of volumes of solids of revolution and the solution of simple ordinary differential equations; # understand the extension of the real numbers to the set of complex numbers and their arithmetic, including Cartesian representation and polar form.
Assessment:	Ten written assignments due at weekly intervals throughout the semester amounting to a total of up to 50 pages of written work (20%), and a 3-hour written examination conducted during the examination period (80%).
Prescribed Texts:	None
Recommended Texts:	Hass, Weir, Thomas, *University Calculus Early Transcendentals 2nd edition*, Pearson, 2012.
Breadth Options:	This subject potentially can be taken as a breadth subject component for the following courses: # **Bachelor of Arts (https://handbook.unimelb.edu.au/view/2015/B-ARTS)** # **Bachelor of Commerce (https://handbook.unimelb.edu.au/view/2015/B-COM)** # **Bachelor of Environments (https://handbook.unimelb.edu.au/view/2015/B-ENVS)** # **Bachelor of Music (https://handbook.unimelb.edu.au/view/2015/B-MUS)** You should visit **learn more about breadth subjects (http://breadth.unimelb.edu.au/breadth/info/index.html)** and read the breadth requirements for your degree, and should discuss your choice with your student adviser, before deciding on your subjects.
Fees Information:	Subject EFTSL, Level, Discipline & Census Date, http://enrolment.unimelb.edu.au/fees
Generic Skills:	In addition to learning specific skills that will assist students in their future careers in science, they will have the opportunity to develop generic skills that will assist them in any future career path. These include: # problem-solving skills: the ability to engage with unfamiliar problems and identify relevant solution strategies; # analytical skills: the ability to construct and express logical arguments and to work in abstract or general terms to increase the clarity and efficiency of analysis; # collaborative skills: the ability to work in a team; and # time-management skills: the ability to meet regular deadlines while balancing competing commitments.

Notes:	This subject is available for science credit to students enrolled in the BSc (both pre-2008 and new degrees), BASc or a combined BSc course. Students with a study score of 30 or more in VCE Specialist Mathematics 3/4 or equivalent may not enrol in this subject for credit. Such students should enrol in one of # MAST10006 Calculus 2 # MAST10007 Linear Algebra # MAST10008 Accelerated Mathematics 1 # MAST10009 Accelerated Mathematics 2 Students with a study score of 29 in VCE Specialist Mathematics 3/4 or equivalent, are eligible to enrol in MAST10005 Calculus 1, MAST10006 Calculus 2 or MAST10007 Linear Algebra. Such students should seek course advice before completing their enrolment.
Related Course(s):	Bachelor of Environments
Related Majors/Minors/ Specialisations:	B-ENG Chemical Engineering stream B-ENG Chemical and Biomolecular Engineering stream B-ENG Civil Engineering stream B-ENG Electrical Engineering stream B-ENG Mechanical Engineering stream B-ENG Software Engineering stream Civil (Engineering) Systems major Engineering Systems Environmental Engineering Systems major Environmental Science major Environments Discipline subjects Geomatics (Geomatic Engineering) major Science-credited subjects - new generation B-SCI and B-ENG. Selective subjects for B-BMED Spatial Systems