620-154 Calculus 1

Credit Points:	12.50
Level:	1 (Undergraduate)
Dates & Locations:	2009, This subject commences in the following study period/s: Semester 1, - Taught on campus. Semester 2, - Taught on campus. Lectures and practice classes.
Time Commitment:	Contact Hours: 36 one-hour lectures (three per week), 12 one-hour practice classes (one per week). Total Time Commitment: 120 hours total time commitment.
Prerequisites:	Study score of 25 or more in VCE Mathematical Methods 3/4 or equivalent, or *Introduction to Mathematics*.
Corequisites:	None
Recommended Background Knowledge:	None
Non Allowed Subjects:	Students may only gain credit for one of 620-151 (prior to 2008), *Calculus 1*, 620-161 (prior to 2008). Students who have completed 620-121 (prior to 2008), 620-140 (prior to 2008) or 620-141 (prior to 2008) may not enrol in this subject for credit.
Core Participation Requirements:	It is University policy to take all reasonable steps to minimise the impact of disability upon academic study and reasonable steps will be made to enhance a student's participation in the University's programs. Students who feel their disability may impact upon their active and safe participation in a subject are encouraged to discuss this with the relevant subject coordinator and the Disability Liaison Unit.
Coordinator:	Dr Deborah King
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: slope fields, 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.
Objectives:	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:	Up to 50 pages of written assignments 20% (due during semester), a 3-hour written examination 80% (in the examination period).
Prescribed Texts:	J Hass, M Weir, G Thomas, University Calculus, Pearson Education, Inc., 2007
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/2009/D09)** # **Bachelor of Commerce (https://handbook.unimelb.edu.au/view/2009/F04)** # **Bachelor of Environments (https://handbook.unimelb.edu.au/view/2009/A04)** # **Bachelor of Music (https://handbook.unimelb.edu.au/view/2009/M05)** 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 score of 27 or more in VCE Specialist Mathematics 3/4 will normally not be permitted to enrol in this subject; such students should enrol in one of *Calculus 2, Linear Algebra* or *Accelerated Mathematics 1*.
Related Course(s):	Bachelor of Engineering
Related Majors/Minors/ Specialisations:	Civil (Engineering) Systems First year mathematics and statistics Physical (Environmental Engineering) Systems