620-155 Calculus 2

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:	A study score of at least 27 in VCE Specialist Mathematics 3/4, or one of # 620-151 (prior to 2008) # *Calculus 1* # 620-161 (prior to 2008) # *Linear Algebra* or permission from the Director of the Mathematics and Statistics Learning Centre.
Corequisites:	None
Recommended Background Knowledge:	None
Non Allowed Subjects:	Students may only gain credit for one of 620-113 (prior to 2008), 620-123 (prior to 2008), 620-143 (prior to 2009), *Calculus 2, Accelerated Mathematics 2* (620-158 Mathematics 2 prior to 2009), 620-193 (prior to 2006). Students who have completed 620-121 (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 Christine Sue Mangelsdorf
Subject Overview:	This subject will extend knowledge of calculus from school. Students are introduced to hyperbolic functions and their inverses, the complex exponential and functions of two variables. Techniques of differentiation and integration will be extended to these cases. Students will be exposed to a wider class of differential equation models, both first and second order, to describe systems such as population models, electrical circuits and mechanical oscillators. Calculus topics include: intuitive idea of limits, continuity and differentiability of functions of one variable, hyperbolic functions and their inverses, implicit differentiation, level curves, partial derivatives, chain rules for partial derivatives, directional derivative, tangent planes and extrema for functions of several variables. Complex exponential topics include: definition, derivative, integral and applications. Integration topics include: techniques of integration and double integrals. Ordinary differential equations topics include: first order (separable, linear via integrating factor) and applications, second order constant coefficient (particular solutions, complementary functions) and applications.
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 25 pages of written assignments 10% (due during semester), a 45-minute written test 10% (held mid-semester), a 3-hour written examination 80% (in the examination period).
Prescribed Texts:	Calculus: Early Transcendentals (H. Anton, I. Bivens and S. Davis), 8th edn, Wiley, 2005.
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 40 or more in VCE Specialist Mathematics 3/4 will normally not be permitted to enrol in this subject; such students should enrol in *Accelerated Mathematics 1* or *Accelerated Mathematics 2*.
Related Course(s):	Bachelor of Engineering
Related Majors/Minors/ Specialisations:	Bioengineering Systems Civil (Engineering) Systems First year mathematics and statistics Physical (Environmental Engineering) Systems