

100-level SUBJECT HANDBOOK ENTRY 2008 – New Generation Subjects

Subject Code	620-154
Title of the subject	Calculus 1
Credit points	12.5
Coordinator	Karen Baker
Semester of offer	1, repeat 2
Prerequisite	Study score of 25 or more in VCE Mathematical Methods 3/4 or equivalent, or 620-173
Mode of delivery	Lectures and tutorials
Contact hours	36 one-hour lectures (three per week), 12 one-hour tutorials (one per week)
Estimated total time commitment	120 hours
Description	<p>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.</p> <p>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.</p>
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	To be determined
Notes	<p>Students with a score of 27 or more in Specialist Mathematics 3/4 will normally not be permitted to enrol in this subject; such students should enrol in one of 620-155, 620-156 or 620-157.</p> <p>Students may only gain credit for one of [07]620-151, 620-154, [07]620-161.</p> <p>Students who have completed [07]620-121,</p>

	[07]620-140 or [07]620-141 may not enrol in this subject for credit.
Subject objectives	<p>Students completing this subject will:</p> <ul style="list-style-type: none"> • 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.
Generic skills	<p>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</p> <ul style="list-style-type: none"> • 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; • time-management skills: the ability to meet regular deadlines while balancing competing

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