

620-296 Multivariable and Vector Calculus

Credit Points:	12.50
Level:	2 (Undergraduate)
Dates & Locations:	2009, This subject commences in the following study period/s: Semester 1, - Taught on campus. Lectures and practice classes.
Time Commitment:	Contact Hours: 36 one-hour lectures (three per week), 11 one-hour practice classes (one per week) Total Time Commitment: 120 hours total time commitment.
Prerequisites:	620-157 Mathematics 1 (prior to 2009) and 620-158 Mathematics 2 (prior to 2009).
Corequisites:	None
Recommended Background Knowledge:	None
Non Allowed Subjects:	Students may only gain credit for one of <i>Multivariable and Vector Calculus</i> , <i>Vector Calculus</i> (620-231 Vector Analysis prior to 2009), 620-233 (prior to 2009)
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:	Prof Paul Anthony Pearce
Subject Overview:	This subject introduces functions of several variables, the fundamental concepts of vector calculus, relations between line, surface and volume integrals, and selected applications of multivariable and vector calculus. Functions of several variables topics include: surfaces, level curves, partial derivatives, chain rules for partial derivatives, directional derivative, tangent planes, differentiability, Taylor series, extrema, Hessian, constrained extrema, polar, cylindrical and spherical coordinates, coordinate transformations, double and triple integrals. Vector calculus topics include: vector differential operators, vector fields, gradient, divergence and curl; space curves, line integrals, conservative fields; surface and volume integrals; the integral theorems of Green, Gauss and Stokes and selected applications.
Objectives:	Students completing this subject should: <ul style="list-style-type: none"> # Comprehend the manipulation of partial derivatives and vector differential operators. # Have developed the ability to obtain extrema of functions of several variables; calculate line, surface and volume integrals; work in curvilinear coordinates; apply integral theorems # Appreciate the fundamental concepts of vector calculus; the relations between line, surface and volume integrals.
Assessment:	Up to 50 pages of written assignments 20% (due during semester), a 3-hour written examination 80% (in the examination period).
Prescribed Texts:	None
Recommended Texts:	M. R. Spiegel, Vector Analysis or Advanced Calculus (Schaum Outline Series)
Breadth Options:	This subject potentially can be taken as a breadth subject component for the following courses: <ul style="list-style-type: none"> # Bachelor of Arts (https://handbook.unimelb.edu.au/view/2009/D09) # Bachelor of Commerce (https://handbook.unimelb.edu.au/view/2009/F04)

	<p># Bachelor of Environments (https://handbook.unimelb.edu.au/view/2009/A04)</p> <p># Bachelor of Music (https://handbook.unimelb.edu.au/view/2009/M05)</p> <p>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.</p>
Fees Information:	Subject EFTSL, Level, Discipline & Census Date, http://enrolment.unimelb.edu.au/fees
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 commitments.
Notes:	<p>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</p> <p>This is the third subject of a three-subject sequence 620-157 Mathematics 1 (prior to 2009), 620-158 Mathematics 2 (prior to 2009) and <i>Multivariable and Vector Calculus</i> for students with a very high level of achievement in VCE Specialist Mathematics 3/4 or equivalent. This subject sequence is equivalent, in content, to the four subjects <i>Calculus 2</i>, <i>Linear Algebra</i>, <i>Vector Calculus</i> and <i>Real Analysis with Applications</i>, presenting some topics from a more advanced perspective.</p>