MAST20009 Vector Calculus

Credit Points:	12.5
Level:	2 (Undergraduate)
Dates & Locations:	2016, 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:	One of **Subject** / **Study Period Commencement:** / **Credit Points:** MAST10006 Calculus 2 / Semester 1, Semester 2 / 12.50 MAST10009 Accelerated Mathematics 2 / Semester 2 / 12.50 and one of **Subject** / **Study Period Commencement:** / **Credit Points:** MAST10007 Linear Algebra / Summer Term, Semester 1, Semester 2 / 12.50 MAST10008 Accelerated Mathematics 1 / Semester 1 / 12.50 # MAST10013 UMEP Maths for High Achieving Students
Corequisites:	None
Recommended Background Knowledge:	None
Non Allowed Subjects:	Students may only gain credit for one of # MAST20009 Vector Calculus # 620-296 Multivariable and Vector Calculus (prior to 2010) Passing MAST20009 Vector Calculus precludes subsequent credit for MAST20029 Engineering Mathematics. Enrolment in MAST20009 Vector Calculus is permitted for students who have passed MAST20029 Engineering Mathematics. (N.B. Students in this situation will need to contact their student centre for assistance in enrolling in MAST20009). Concurrent enrolment in both MAST20009 Vector Calculus and MAST20029 Engineering Mathematics is not permitted.
Core Participation Requirements:	For the purposes of considering request for Reasonable Adjustments under the Disability Standards for Education (Cwth 2005), and Students Experiencing Academic Disadvantage Policy, academic requirements for this subject are articulated in the Subject Description, Subject Objectives, Generic Skills and Assessment Requirements of this entry.The University is dedicated to provide support to those with special requirements. Further details on the disability support scheme can be found at the Disability Liaison Unit website: http://www.services.unimelb.edu.au/disability/
Coordinator:	Assoc Prof Andrei Ratiu, Dr Mark Fackrell

Contact:	Second Year Coordinator **Email: sycoord@ms.unimelb.edu.au (mailto:sycoord@ms.unimelb.edu.au)**
Subject Overview:	This subject studies the fundamental concepts of functions of several variables and vector calculus. It develops the manipulation of partial derivatives and vector differential operators. The gradient vector is used to obtain constrained extrema of functions of several variables. Line, surface and volume integrals are evaluated and related by various integral theorems. Vector differential operators are also studied using curvilinear coordinates. Functions of several variables topics include limits, continuity, differentiability, the chain rule, Jacobian, Taylor polynomials and Lagrange multipliers. Vector calculus topics include vector fields, flow lines, curvature, torsion, gradient, divergence, curl and Laplacian. Integrals over paths and surfaces topics include line, surface and volume integrals; change of variables; applications including averages, moments of inertia, centre of mass; Green's theorem, Divergence theorem in the plane, Gauss' divergence theorem, Stokes' theorem; and curvilinear coordinates.
Learning Outcomes:	On completion of this subject, the student should : # Understand calculus of functions of several variables; differential operators; line, surface and volume integrals; curvilinear coordinates; integral theorems # Have developed the ability to work with limits and continuity; 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:	Three to five written assignments due at regular intervals during semester amounting to a total of up to 50 pages (20%), and a 3-hour written examination in the examination period (80%).
Prescribed Texts:	None
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/2016/B-ARTS)** # **Bachelor of Commerce (https://handbook.unimelb.edu.au/view/2016/B-COM)** # **Bachelor of Environments (https://handbook.unimelb.edu.au/view/2016/B-ENVS)** # **Bachelor of Music (https://handbook.unimelb.edu.au/view/2016/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; # 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.
Related Majors/Minors/ Specialisations:	Applied Mathematics Applied Mathematics

	Physics Physics Pure Mathematics Pure Mathematics Science-credited subjects - new generation B-SCI and B-ENG. Selective subjects for B-BMED
Related Breadth Track(s):	Accelerated Mathematics Mathematics and Statistics