MAST30024 Geometry

Credit Points:	12.50
Level:	3 (Undergraduate)
Dates & Locations:	2010, Parkville This subject commences in the following study period/s: Semester 2, Parkville - Taught on campus. Lectures and practice classes.
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 120 hours
Prerequisites:	One of # **620-231 Vector Calculus (/view/2010/620-231)** # 620-296 Multivariable and Vector Calculus (prior to 2010) and one of # **620-295 Real Analysis with Applications (/view/2010/620-295)** # **620-158 Accelerated Mathematics 2 (/view/2010/620-158)**
Corequisites:	None
Recommended Background Knowledge:	None
Non Allowed Subjects:	None
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:	Assoc Prof Craig Hodgson
Contact:	Third Year Coordinator **Email: tycoord@ms.unimelb.edu.au (mailto:tycoord@ms.unimelb.edu.au)**
Subject Overview:	This subject introduces three areas of geometry that play a key role in many branches of mathematics and physics. In differential geometry, calculus and the concept of curvature will be used to study the shape of curves and surfaces. In topology, geometric properties that are unchanged by continuous deformations will be studied to find a topological classification of surfaces. In algebraic geometry, curves defined by polynomial equations will be explored. Remarkable connections between these areas will be discussed. Topics include: Topological classification of surfaces, Euler characteristic, orientability. Introduction to the differential geometry of surfaces in Euclidean space: smooth surfaces, tangent planes, length of curves, Riemannian metrics, Gaussian curvature, minimal surfaces, Gauss-Bonnet theorem. Complex algebraic curves, including conics and cubics, genus.
Objectives:	On completion of this subject, students should Have an understanding of: # Euler characteristic and the topological classification of surfaces; # Riemannian metrics and curvature for surfaces; # the Gauss-Bonnet theorem; # how surfaces arise as complex algebraic curves. Be able to:

	# calculate Euler characteristic and identify surfaces described combinatorially; # compute lengths, angles, areas for a given Riemannian metric; # compute principal curvatures, mean curvature, Gaussian curvature for surfaces in Euclidean space; # apply the Gauss-Bonnet theorem; # do simple calculations with algebraic plane curves.
Assessment:	Two or three 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
Recommended Texts:	N. Hitchin, Geometry of surfaces, Oxford University lecture notes, available online. M. do Carmo, Differential geometry of curves and surfaces, Prentice-Hall, 1976. F. Kirwan, Complex algebraic curves, Cambridge University Press, 1992.
Breadth Options:	This subject potentially can be taken as a breadth subject component for the following courses: # **Bachelor of Commerce (https://handbook.unimelb.edu.au/view/2010/B-COM)** # **Bachelor of Environments (https://handbook.unimelb.edu.au/view/2010/B-ENVS)** # **Bachelor of Music (https://handbook.unimelb.edu.au/view/2010/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 Course(s):	Bachelor of Science
Related Majors/Minors/ Specialisations:	Mathematics and Statistics (Mathematical Physics specialisation) Mathematics and Statistics (Pure Mathematics specialisation) Pure Mathematics