MAST30007 Applied Partial Differential Equations

Credit Points:	12.50
Level:	3 (Undergraduate)
Dates & Locations:	2010, Parkville This subject commences in the following study period/s: Semester 1, 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)** # 620-233 Vector Analysis Advanced (prior to 2009) and one of # 620-232 Mathematical Methods (prior to 2010) # 620-234 Mathematical Methods Advanced (prior to 2009)
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:	Prof Barry Hughes
Contact:	Third Year Coordinator **Email: tycoord@ms.unimelb.edu.au (mailto:tycoord@ms.unimelb.edu.au)**
Subject Overview:	This subject illustrates how partial differential equations (PDEs) of first and second order arise in mathematical modelling of the real world. It introduces basic techniques for solving these PDEs such as eigenfunction expansions, Green's functions, similarity solutions, method of images, and addresses general features of the solutions. The subject also covers certain topics in ordinary differential equations (ODEs). Topics covered include: # First-order non-linear PDEs: characteristics, fans, shocks and applications; # Classification of linear second order PDEs in two variables, canonical forms, initial and boundary conditions; # The wave equation, d'Alembert's solution; # Laplace's equation, Poisson's equation, harmonic functions, maximum and minimum principles; # The heat equation, convective diffusion equation, Burgers' equation and the Hopf-Cole transformation; # Sturm-Liouville equation, properties of eigenfunctions and eigenvalues; and

	# Series solutions of ODEs, ordinary points, regular singular points, Bessel and Legendre functions.
Objectives:	On completion of this subject, students should: # know contexts in which partial differential equations provide relevant models; # understand distinctive features of several important classes of partial differential equations and general properties of the solutions; # be able to find exact solutions of simple first and second-order partial differential equations in two variables; # learn how eigenfunction methods arise naturally and can be applied in partial differential equation problems.
Assessment:	A 45-minute written test held mid-semester (either 0% or 20%); a 3-hour written examination in the examination period (80% or 100%). The relative weighting of the examination and the mid-semester test will be chosen so as to maximise the student's final mark.
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/2010/B-ARTS)** # **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.
Notes:	This subject is available for science credit to students enrolled in the BSc (pre-2008 degree only), BASc or a combined BSc course.
Related Majors/Minors/ Specialisations:	Mathematics & Statistics Major Mathematics and Statistics (Applied Mathematics specialisation) Mathematics and Statistics (Mathematical Physics specialisation)