MAST30023 Differential Equations for Engineers

Credit Points:	12.50
Level:	3 (Undergraduate)
Dates & Locations:	2011, 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 **Subject** / **Study Period Commencement:** / **Credit Points:** MAST20009 Vector Calculus / Semester 1, Semester 2 / 12.50 620-296 Multivariable and Vector Calculus (prior to 2010)
Corequisites:	None
Recommended Background Knowledge:	None
Non Allowed Subjects:	Students may only gain credit for one of **Subject** / **Study Period Commencement:** / **Credit Points:** MAST30023 Differential Equations for Engineers / Semester 1 / 12.50 MAST20029 Engineering Mathematics / Summer Term, Semester 1, Semester 2 / 12.50 # 620-232 Mathematical Methods (prior to 2010) # 620-234 Mathematical Methods Advanced (prior to 2009) # 431-202 Engineering Analysis B (prior to 2009) Students who have completed 620-331 Applied Partial Differential Equations may not enrol in this subject for credit. Students may only gain credit for one of **Subject** / **Study Period Commencement:** / **Credit Points:** MAST30023 Differential Equations for Engineers / Semester 1 / 12.50 MAST30029 Partial Differential Equations / Semester 2 / 12.50
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 Steven Carnie
Contact:	Third Year Coordinator

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Subject Overview:	This subject introduces important mathematical methods required in engineering. Systems of ordinary differential equations and first order (linear and nonlinear) and second order linear partial differential equations are solved by a variety of methods and their solution behaviour is interpreted. The subject introduces the ideas of Laplace transforms, phase plane and stability, method of characteristics, Fourier series, eigenfunctions and eigenvalues and separation of variables. Topics include: Laplace transforms; systems of linear and nonlinear first order ordinary differential equations including phase plane; first order linear and quasilinear partial differential equations including the method of characteristics, fans and shocks; classification of second order partial differential equations; method of characteristics for hyperbolic partial differential equations, method of separation of variables and eigenfunction expansion.
Objectives:	On completion of this subject students should be able to: # solve ordinary differential equations using Laplace transforms # determine phase plane portraits for linear and nonlinear systems of ordinary differential equations # determine convergence and divergence of sequences and series # represent suitable functions using Fourier series # solve #rst order partial differential equations using the method of characteristics # solve second order hyperbolic partial differential equations using the method of characteristics # solve second order partial differential equations using separation of variables and Laplace transforms
Assessment:	Three or four 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:	E Kreysig, Advanced Engineering Mathematics, 9th Ed. Wiley, 2006.
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/2011/B-COM)** # **Bachelor of Environments (https://handbook.unimelb.edu.au/view/2011/B-ENVS)** # **Bachelor of Music (https://handbook.unimelb.edu.au/view/2011/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 speci#c mathematical skills students 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 the analysis; # collaborative skills: the ability to work in a team; # time management skills: the ability to meet regular deadlines while balancing competing tasks; # computer skills: the ability to use mathematical computing packages.
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:	Science credit subjects* for pre-2008 BSc, BASc and combined degree science courses