620-293 Engineering Mathematics

Credit Points:	12.50
Level:	2 (Undergraduate)
Dates & Locations:	2009, This subject commences in the following study period/s: Summer Term, - Taught on campus. Semester 1, - Taught on campus. Semester 2, - 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:	One of # *Calculus 2* # *Accelerated Mathematics 2* (620-158 Mathematics 2 prior to 2009) and one of # *Linear Algebra* # *Accelerated Mathematics 1* (620-157 Mathematics 1 prior to 2009) **Or** 431-201.
Corequisites:	None
Recommended Background Knowledge:	None
Non Allowed Subjects:	Students may only gain credit for one of *Engineering Mathematics* and 431-202.
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 participation are encouraged to discuss this with the subject coordinator and the Disability Liaison Unit.
Coordinator:	Dr Christine Sue Mangelsdorf
Subject Overview:	This subject introduces important mathematical methods required in engineering such as manipulating vector differential operators, computing multiple integrals and using integral theorems. A range of ordinary and partial differential equations are solved by a variety of methods and their solution behaviour is interpreted. The subject also introduces sequences and series including the concepts of convergence and divergence. Topics include: Vector calculus, including Green's and Stokes' Theorems; sequences and series; Fourier series, Laplace transforms, including convolution; systems of homogeneous ordinary differential equations, including phase plane and linearization for nonlinear systems; first order and second order partial differential equations, including characteristics, fans, shocks, D'Alembert's solution and separation of variables.
Objectives:	At the completion of this subject, students should be able to # manipulate vector differential operators # determine convergence and divergence of sequences and series # solve ordinary differential equations using Laplace transforms # sketch phase plane portraits for linear and nonlinear systems of ordinary differential equations # represent suitable functions using Fourier series

	# solve first order partial differential equations using method of characteristics # solve second order partial differential equations using separation of variables
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:	E Kreysig, *Advanced Engineering Mathematics,* Ninth Edition, Wiley, 2006.
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/2009/D09)** # **Bachelor of Commerce (https://handbook.unimelb.edu.au/view/2009/F04)** # **Bachelor of Environments (https://handbook.unimelb.edu.au/view/2009/A04)** # **Bachelor of Music (https://handbook.unimelb.edu.au/view/2009/M05)** 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 tasks.
Notes:	Students enrolled in the BSc (new degree only) will receive science credit for the completion of this subject. Note for BSc (new degree) students: This subject is intended only for students pursuing an Engineering Systems major, who do not wish to take any further study in Mathematics and Statistics or Physics. Other students, including those wanting to supplement their Engineering Systems major with further study in Mathematics and Statistics or Physics, should seek advice.
Related Course(s):	Bachelor of Engineering Bachelor of Engineering (Computer) and Bachelor of Arts Bachelor of Engineering (Computer) and Bachelor of Commerce Bachelor of Engineering (Computer) and Bachelor of Laws Bachelor of Engineering (Electrical) and Bachelor of Arts Bachelor of Engineering (Electrical) and Bachelor of Commerce Bachelor of Engineering (Electrical) and Bachelor of Laws Bachelor of Engineering(Mechanical & Manufacturing) and Bachelor of Laws
Related Majors/Minors/ Specialisations:	Bioengineering Systems Civil (Engineering) Systems Physical (Environmental Engineering) Systems