MAST90066 Continuum Mechanics and Applications

Credit Points:	12.50
Level:	9 (Graduate/Postgraduate)
Dates & Locations:	This subject is not offered in 2013.
Time Commitment:	Contact Hours: Contact Hours: 36 hours comprising 1 two-hour lectures per week and 1 one-hour lecture/practice class per week. Total Time Commitment: 3 contact hours and 7 hours private study per week
Prerequisites:	None
Corequisites:	None
Recommended Background Knowledge:	It is recommended that students have completed a second year subject in vector analysis (equivalent of MAST20009 Vector Calculus) and a third year subject in partial differential equations (equivalent of MAST30029 Partial Differential Equations).
Non Allowed Subjects:	None
Core Participation Requirements:	For the purposes of considering requests 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 for 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/
Contact:	Email: **jsader@unimelb.edu.au (mailto:jsader@unimelb.edu.au)**
Subject Overview:	This subject focuses on physical principles and mathematical techniques for modelling the flow and deformation of materials. This finds applications in modern technological advances ranging from nanoelectromechanical systems (NEMS) to processes in the pharmaceutical industry involving microfluidic "lab-on-chip" technologies. It develops vector and tensor methods needed to formulate these principles mathematically; and also introduces the concept of a constitutive equation. Students should develop the ability to select a constitutive equation and correctly pose relevant boundary-value problems; to solve transport and flow problems in simple geometries; to identify valid approximate analyses; and to interpret solutions in physical terms. This subject demonstrates the potential for mathematical modelling of flow and transport processes that arise in a host of industries including manufacturing, mineral exploitation and other areas of science and technology. It also shows the intimate connection between continuum mechanical problems and fundamental mathematical problems
Objectives:	On completion of this subject, students should: # comprehend the basic mathematical principles governing continuum mechanics and fluid flow; # understand the apparatus needed to formulate these principles mathematically (including vector and tensor methods); # developed skills in solving flow problems in simple geometries; # appreciate the potential for mathematical modelling of flow processes which arise in many areas of science and technology; # developed the ability to interpret solutions in physical terms.
Assessment:	Up to 50 pages of written assignments (30%; two assignments worth 15% each, due mid and late in semester), a 3 hour written examination (70%, in the examination period).
Prescribed Texts:	None
Recommended Texts:	G. Batchelor, An Introduction to Fluid Dynamics, CUP, 1967.

	A.R. Paterson, A First Course in Fluid Dynamics, CUP, 1983. D. J. Acheson, Elementary Fluid Dynamics, Clarendon, 1990.
Breadth Options:	This subject is not available as a breadth subject.
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.
Related Course(s):	Master of Philosophy - Engineering Master of Science (Mathematics and Statistics) Ph.D.- Engineering
Related Majors/Minors/ Specialisations:	Mathematics and Statistics