MAST90043 Advanced Materials Modelling

Credit Points:	12.50
Level:	9 (Graduate/Postgraduate)
Dates & Locations:	2010, Parkville This subject commences in the following study period/s: Semester 2, Parkville - Taught on campus.
Time Commitment:	Contact Hours: 36 hours comprising 1 two-hour lecture per week and 1 one-hour practical class per week. Total Time Commitment: Not available
Prerequisites:	None
Corequisites:	None
Recommended Background Knowledge:	It is recommended that students complete a third year subject in continuum mechanics (equivalent to 630-342 [2008] Industrial & Applied Mathematics).
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/
Coordinator:	Assoc Prof Antoinette Tordesillas, Dr Sean Shi
Contact:	Assoc Prof Antoinette Tordesillas Email: **atordesi@unimelb.edu.au (mailto:atordesi@unimelb.edu.au)** Dr Sean Shi Email: **shiy@unimelb.edu.au (mailto:shiy@unimelb.edu.au)**
Subject Overview:	This subject focuses on physical principles and techniques for modelling the behaviour of advanced materials, which find applications in modern technological advances ranging from nanoelectromechanical systems and Atomic Force Microscopy to processes in the pharmaceutical and geotechnical industries involving the manipulation of fine powders and grains. Particular attention will be paid to development of continuum techniques and discrete models for describing the deformation and mechanical behaviour of fluids and granular materials. As such this subject will draw directly on fundamental knowledge gained by students in the field of continuum mechanics. Topics to be covered include basic elements of granular deformation and flow and numerical methods in fluid mechanics. Advanced mathematical techniques will also be introduced enabling both exact and approximate solutions.
Objectives:	After completing this subject, students should: # appreciate the context in which continuum and discrete modelling may arise in applications of advanced materials; # develop high level mathematical tools and knowledge that can be used to model a range of problems in solid mechanics; # develop the ability to implement physically justified approximations in solution of complex problems; # be exposed to both computational and analytical tools, and understand the various contexts in which they can be applied; and # gain the ability to pursue further studies in this and related areas.

Assessment:	Up to 60 pages of assignments (75%: three assignments worth 25% each, due early, mid and late in semester), a two-hour written examination (25%, in the examination period).
Prescribed Texts:	TBA.
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:	Upon the completion of this subject, students should develop the following generic skills: # problem-solving skills (especially through tutorial exercises and assignments) including engaging with unfamiliar problems and identifying relevant strategies; # analytical skills including 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; # ability to work in a team, through interactions with other students.
Related Course(s):	Master of Science (Mathematics and Statistics)