MCEN90008 Fluid Dynamics

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 of lectures, 12 hours of tutorials and 4 hours of practical laboratory and 2 hours of computer laboratory work. Total Time Commitment: 120 hours
Prerequisites:	**436-301 Thermofluids (/view/2010/436-301)** and **433296 Engineering Computation (/view/2010/436-296)**
Corequisites:	N/A
Recommended Background Knowledge:	N/A
Non Allowed Subjects:	436351 Thermofluids 1 436352 Thermofluids 2
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
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Subject Overview:	This subject introduces students to analysis techniques used in subsonic and supersonic flows. Topics covered include basic introduction to inviscid flow with and without vorticity; concepts and analysis using stream function and velocity potential; incompressible viscous flow past bodies with vortex shedding; theories of thin airfoils; gas dynamics in subsonic and supersonic flow; shock expansion theory; and boundary layer and shock wave interactions. Turbulence modelling using the Reynolds Averaged Navier-Stokes equations. Students will also be given exposure to commercial Computational Fluid Dynamics (CFD) package and the necessary theory to be able to effectively use CFD to solve complex fluid flow problems in engineering systems.
Objectives:	At the conclusion of this subject students should be able to: # Analyse inviscid flow of an incompressible fluid with simple boundary conditions and know where the concepts are applicable in practice; # Use complex velocity potential analysis to solve a variety of inviscid flow problems including incompressible flow past airfoils

	# Apply shock expansion theory to the solution of flow in a variety of situations including prediction of lift and drag of two-dimensional bodies in supersonic flow; # Apply Ackeret or linear theory to thin airfoils; # Evaluate viscous effects, boundary layer and shock wave interactions.
Assessment:	Assessment includes:One 3-hour end of semester written examination (70%), One computer laboratory report up to 1000 words (10%) due before week 8 of the semester, Two practical laboratory reports of equal weight, each up to 2000 words, scheduled throughout the semester (20% total).
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:	On completion of the subject students should have the following skills - # Ability to apply knowledge of science and engineering fundamentals # Ability to undertake problem identification, formulation, and solution # Ability to utilise a systems approach to complex problems and to design and operational performance # Ability to communicate effectively, with the engineering team and with the community at large # Ability to function effectively as an individual and in multidisciplinary and multicultural teams, as a team leader or manager as well as an effective team member
Related Course(s):	Bachelor of Engineering
Related Majors/Minors/ Specialisations:	Master of Engineering (Mechatronics)