

400-306 Fluid Mechanics

Credit Points:	12.50
Level:	3 (Undergraduate)
Dates & Locations:	2009, This subject commences in the following study period/s: Semester 2, - Taught on campus.
Time Commitment:	Contact Hours: Thirty-two hours of lectures, 12 hours of tutorials and 4 hours of laboratory work. Total Time Commitment: Not available
Prerequisites:	None
Corequisites:	431-202 Engineering Analysis B or 620-232 Mathematical Methods
Recommended Background Knowledge:	None
Non Allowed Subjects:	None
Core Participation Requirements:	<p><p>For the purposes of considering request for Reasonable Adjustments under the Disability Standards for Education (Cwth 2005), and Student Support and Engagement Policy, academic requirements for this subject are articulated in the Subject Overview, Learning Outcomes, Assessment and Generic Skills sections of this entry.</p> <p>It is University policy to take all reasonable steps to minimise the impact of disability upon academic study, and reasonable adjustments will be made to enhance a student's participation in the University's programs. Students who feel their disability may impact on meeting the requirements of this subject are encouraged to discuss this matter with a Faculty Student Adviser and Student Equity and Disability Support: http://services.unimelb.edu.au/disability</p></p>
Coordinator:	Assoc Prof Malcolm Davidson, Mr Roger Hughes
Subject Overview:	<p>This subject treats the fundamental engineering science of characterizing and mathematically modelling fluid flow and the conduits and machinery for enabling and controlling that flow in a range of engineering applications. Topics covered include; fluid statics and stability of floating bodies, manometry; Newton's law of viscosity, introduction to Newtonian and non-Newtonian fluids, introduction to thermodynamics - ideal non-flow and flow, processes, laws of thermodynamics, Carnot's principle, Clausius inequality; derivation of the continuity equation, mechanics energy balance, friction losses in a straight pipe, Fanning friction factor, treatment of roughness, valves and fittings; simple network problems; compressible flow - propagation of a pressure wave, isothermal and adiabatic flow equations in a pipe, choked flow. Pumps - pump characteristics, centrifugal pumps, derivation of theoretical head; head losses leading to the actual pump head curve, calculating system head, determining the operating point of a pumping system throttling for flow control, cavitation and NPSH, affinity laws and pump scale-up, introduction to positive displacement pumps; stirred tanks - radial, axial and tangential flow, types of agitators, vortex elimination, the standard tank configuration, power number and power curve, dynamics and geometric similarity in scale-up.</p>
Objectives:	On completion of this subject students should be able to apply the principles of force balance in stationary fluids to solve engineering problems; solve mechanical energy balances in one dimensional pipe flow and; and be able to scale-up and stirred tanks using engineering principles.
Assessment:	Two assignments, one due around Week 4 and one due around Week 8 of the semester (20% of the total mark) and one end of semester three hour examination (80% of total mark). A mark of 505 or more in the examination is needed to pass the subject.
Prescribed Texts:	None
Breadth Options:	<p>This subject potentially can be taken as a breadth subject component for the following courses:</p> <ul style="list-style-type: none"> # Bachelor of Arts (https://handbook.unimelb.edu.au/view/2009/D09) # Bachelor of Commerce (https://handbook.unimelb.edu.au/view/2009/F04)

	<p># Bachelor of Music (https://handbook.unimelb.edu.au/view/2009/M05)</p> <p>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.</p>
Fees Information:	Subject EFTSL, Level, Discipline & Census Date, http://enrolment.unimelb.edu.au/fees
Generic Skills:	<p>On successful completion, students should be able to:</p> <ul style="list-style-type: none"> # ability to undertake problem identification, formulation and solution # capacity for independent thought # ability to plan work and to sue time effectively
Related Course(s):	<p>Bachelor of Engineering Bachelor of Engineering (Chemical) and Bachelor of Arts Bachelor of Engineering (Chemical) and Bachelor of Commerce Bachelor of Engineering (Chemical) and Bachelor of Laws Bachelor of Engineering (Chemical) and Bachelor of Science</p>