ENGR30001 Fluid Mechanics

Credit Points:	12.50
Level:	3 (Undergraduate)
Dates & Locations:	2010, Parkville This subject commences in the following study period/s: Semester 1, Parkville - Taught on campus. Semester 2, Parkville - 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: Estimated 120 hours
Prerequisites:	1 of the following 3 subjects is required as a concurrent prerequisite Concurrent pre-requisites are subjects which can be taken either before or with the subject concerned.

Subject	Study Period Commencement:	Credit Points:
MAST20009 Vector Calculus	Semester 1, Semester 2	12.50

OR

Subject	Study Period Commencement:	Credit Points:
MAST20029 Engineering Mathematics	Summer Term, Semester 1, Semester 2	12.50

OR

Subject	Study Period Commencement:	Credit Points:
620-296 Multivariable and Vector Calculus	Not offered 2010	

Corequisites:	Refer to prerequisite
Recommended Background Knowledge:	None
Non Allowed Subjects:	None
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/
Coordinator:	Assoc Prof Malcolm Davidson, Assoc Prof Roger Hughes
Contact:	Melbourne School of Engineering Office Building 173, Grattan Street The University of Melbourne VIC 3010 Australia General telephone enquiries: + 61 3 8344 6703 + 61 3 8344 6507 Facsimiles: + 61 3 9349 2182 + 61 3 8344 7707 Email: **eng-info@unimelb.edu.au (/)**

Subject Overview:	This subject concerns the fundamental science of fluid flow relevant to a range of engineering applications. Topics covered include: Fluid statics, manometry, stability of floating bodies; laws of thermodynamics, Carnot's principle, derivation of the continuity equation, mechanical energy balance, friction losses in a straight pipe, Newton's law of viscosity, Fanning friction factor, treatment of roughness, valves and fittings; simple network problems; compressible flow, propagation of pressure wave, isothermal and adiabatic flow equations in a pipe , chocked 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, type of agitators, vortex elimination the standard tank configuration, power number and power curve, dynamic and geometric similarity in scale up, Newtonian and non-Newtonian fluids, Multi-dimensional fluid flow momentum flux development of multi-dimensional equations of continuity and for momentum transfer, Navier -Stokes equations, application to tube flow, Couette flow, Stokes flow, turbulence, eddy viscosity, universal velocity profile.
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 pumps and stirred tanks using engineering principles.
Assessment:	Two assignments, one due around Week 4 One due around Week 8 of the semester (20% of the total mark)One end of semester three hour examination (80% of total mark). A mark of 50% or more in the examination is needed to pass the subject.
Prescribed Texts:	None
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/2010/B-ARTS)** # **Bachelor of Commerce (https://handbook.unimelb.edu.au/view/2010/B-COM)** # **Bachelor of Music (https://handbook.unimelb.edu.au/view/2010/B-MUS)** 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:	On successful completion, students should have the following skills: # ability to undertake problem identification, formulation and solution # capacity for independent thought # ability to plan work and to use time effectively
Notes:	
Related Course(s):	Bachelor of Engineering Bachelor of Engineering (Civil) and Bachelor of Arts Bachelor of Engineering (Civil) and Bachelor of Commerce Bachelor of Engineering (Civil) and Bachelor of Laws Bachelor of Engineering (Civil) and Bachelor of Science Bachelor of Engineering (Environmental) and Bachelor of Arts Bachelor of Engineering (Environmental) and Bachelor of Commerce Bachelor of Engineering (Environmental) and Bachelor of Laws Bachelor of Science
Related Majors/Minors/ Specialisations:	Chemical Systems Civil (Engineering) Systems Civil Systems Master of Engineering (Biomolecular) Master of Engineering (Chemical) Master of Engineering (Civil) Master of Engineering (Environmental) Master of Engineering (Mechanical)

	Master of Engineering (Structural) Physical (Environmental Engineering) Systems