ENGR30002 Fluid Mechanics

Credit Points:	12.5
Level:	3 (Undergraduate)
Dates & Locations:	2016, 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: 3 x 1 hour lecture per week, 1 x 1 hour tutorial per week, 1 x 2 hour laboratory work per semester Total Time Commitment: Estimated 170 hours
Prerequisites:	**Subject** / **Study Period Commencement:** / **Credit Points:** MAST20029 Engineering Mathematics / Summer Term, Semester 1, Semester 2 / 12.50 OR **Subject** / **Study Period Commencement:** / **Credit Points:** MAST20030 Differential Equations / Semester 2 / 12.50 If available in the same semester, MAST20030 or MAST20029 may be taken concurrently
Corequisites:	None
Recommended Background Knowledge:	None
Non Allowed Subjects:	ENGR30001 Fluid Mechanics and Thermodynamics MCEN30015 Thermofluids
Core Participation Requirements:	For the purposes of considering applications for Reasonable Adjustments under the Disability Standards for Education (Cwth 2005) and Students Experiencing Academic Disadvantage Policy, this subject requires all students to actively and safely participate in laboratory activities. Students who feel their disability may impact upon their participation are encouraged to discuss this with the Subject Coordinator and the Disability Liaison Unit. http://www.services.unimelb.edu.au/disability/
Coordinator:	Dr Daniel Heath, Dr Marco Ghisalberti
Contact:	Semester 1: Dr Marco Ghisalberti Email: **marco.ghisalberti@unimelb.edu.au (mailto:marco.ghisalberti@unimelb.edu.au)** Semester 2: Dr Daniel Heath Email: **daniel.heath@unimelb.edu.au (mailto:daniel.heath@unimelb.edu.au)**
Subject Overview:	**AIMS** This subject concerns the fundamental science of fluid flow relevant to a range of engineering applications, and is essential for specialisations relating to Chemical, and Civil Engineering. **INDICATIVE CONTENT** Topics covered include - Fluid statics, manometry, 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; principles of open channel flow; compressible flow, propagation of 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, 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.
Learning Outcomes:	**INTENDED LEARNING OUTCOMES (ILO)** On completion of this subject the student is expected to: 1 Apply the principles of force balance in stationary fluids to solve engineering problems 2 Solve mechanical energy balances in one dimensional pipe flow, scale-up pumps, mixers 3 Apply multi-dimensional flow equations to axisymmetric and planar flows.
Assessment:	Three practical or written assignments of no more than 5 pages each (not including diagrams, graphs and raw data); due throughout the semester; overall time commitment of 30-35 hours (10 hours per assignment); Intended Learning Outcomes (ILO's) 1 and 2 assessed in the assignments. (30%) 3 hour end of semester examination; ILOs 1-3 assessed in the exam. (70%) Hurdle requirement: A pass in the end of semester examination is required 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/2016/B-ARTS)** # **Bachelor of Biomedicine (https://handbook.unimelb.edu.au/view/2016/B-BMED)** # **Bachelor of Commerce (https://handbook.unimelb.edu.au/view/2016/B-COM)** # **Bachelor of Music (https://handbook.unimelb.edu.au/view/2016/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:	# Ability to undertake problem identification, formulation and solution # Capacity for independent thought # Ability to plan work and to use time effectively.
Notes:	**LEARNING AND TEACHING METHODS** The subject will be delivered through a combination of lectures and tutorials. Students will also complete one experiment and one assignment which will reinforce the material covered in lectures. **INDICATIVE KEY LEARNING RESOURCES** Students will have access to lecture notes and lecture slides. The subject LMS site also contains worked solutions for all the tutorial assignments. **CAREERS / INDUSTRY LINKS** When available, presentations in a Careers Program or Professional Engineers association will be arranged.
Related Course(s):	Master of Architectural Engineering
Related Majors/Minors/ Specialisations:	B-ENG Chemical Engineering stream B-ENG Chemical and Biomolecular Engineering stream B-ENG Civil Engineering stream

	Chemical Systems Civil (Engineering) Systems major Civil Systems Engineering Systems Environmental Engineering Systems major Environments Discipline subjects Master of Engineering (Biochemical) Master of Engineering (Chemical with Business) Master of Engineering (Chemical) Master of Engineering (Civil with Business) Master of Engineering (Civil) Master of Engineering (Environmental) Master of Engineering (Structural) Science-credited subjects - new generation B-SCI and B-ENG. Selective subjects for B-BMED