MCEN90018 Advanced Fluid Dynamics

Credit Points:	12.50
Level:	9 (Graduate/Postgraduate)
Dates & Locations:	This subject is not offered in 2011. This subject will be available in Semester 2, 2012.
Time Commitment:	Contact Hours: 36 hours lectures, 12 hours tutorials, 2 hours laboratory Total Time Commitment: 120 hours
Prerequisites:	Prerequisite for this subject is -

Subject	Study Period Commencement:	Credit Points:
MCEN90008 Fluid Dynamics	Semester 2	12.50

Corequisites:	None
Recommended Background Knowledge:	N/A
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/
Contact:	Nick Hutchins **nhu@ugrad.unimelb.edu.au (mailto:nhu@ugrad.unimelb.edu.au)**
Subject Overview:	This subject involves the analysis and design of fluid mechanical devices and fundamental engineering problems through the study and analysis of boundary layers and turbulence. Topics include wing theory: Prandtl lifting line, Zhukovsky transform; three-dimensional effects; boundary layers: Navier-Stokes equations; Prandtl's assumptions; Laminar solutions; Von Karman's momentum integral equation; transition; turbulence; turbulent boundary layers; turbulent flow in pipes and ducts; flow pattern topology; vortex dynamics; theories of turbulence; recurrent patterns in turbulence.
Objectives:	At the conclusion of this subject students should be able to: • use wing-theory to calculate lift and drag characteristics of basic airfoil planforms • apply the Navier-Stokes equations to boundary layer flows, and obtain solutions to certain simplified geometries • perform analysis on laminar, transitional and turbulent boundary layers, and calculate the implications of these flows to modern engineering systems. • analyse the mechanical losses in certain engineering systems due to these flow phenomena • identify and characterise recurrent flow topologies and patterns in complex flows, and be able to apply a knowledge of these topologies to predict certain flow behaviours.
Assessment:	One 3-hour examination (70%) at the end of semester. One assignment due week 4 (15%) and one laboratory report of up to 3000 words during the semester (15%) .
Prescribed Texts:	N/A
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:	• Ability to apply knowledge of science and engineering fundamentals • Ability to undertake problem identification, formulation, and solution • Proficiency in engineering design • Ability to communicate effectively, with the engineering team and with the community at large

	• Capacity for creativity and innovation
Related Majors/Minors/ Specialisations:	Master of Engineering (Mechanical)