MCEN90019 Advanced Thermodynamics

Credit Points:	12.50
Level:	9 (Graduate/Postgraduate)
Dates & Locations:	This subject is not offered in 2013.
Time Commitment:	Contact Hours: 36 hours of lectures, up to 24 hours of tutorials and laboratories. Total Time Commitment: 120 hours
Prerequisites:	

Subject	Study Period Commencement:	Credit Points:
MCEN90015 Thermodynamics	Not offered 2013	12.50

Corequisites:	None
Recommended Background Knowledge:	None
Non Allowed Subjects:	MCEN40010 Thermofluids 4
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 Unitwebsite:http://www.services.unimelb.edu.au/disability/
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Subject Overview:	There are 4 main topics of study in this subject. Starting from a thorough analysis of the fundamentals of combustion, the subject progressively leads to the application of these fundamentals to the analysis of flames and engine combustions. # Chemical thermodynamics and kinetics - flame temperatures, Gibbs free energy and equilibrium, chemical kinetics, combustion mechanisms of common fuels. # Governing equations - mass, momentum, species and energy conservation for idealized reactors and simplified reacting flows. # Flames - theoretical analyses of laminar flames, premixed flame (flame speed, quenching, flame stabilization), diffusion jet flame (flame geometry, conserved scalar, soot formation). # Reciprocating engines - engine cycle analysis, turbulent combustion in spark ignition and diesel engines, cylinder-pressure analysis, pollutant formation and emission control, alternative power-trains and fuels.
Objectives:	At the conclusion of this subject students should be able to - • Analyse the equilibrium and kinetics of combustion of different fuels • Use computer software to solve combustion kinetics and flame structures with detailed reaction mechanisms • Apply the fundamental principles of thermodynamics to numerous engineering devices • Use a systems approach to simplify a complex problem
Assessment:	Two assignments or laboratory reports of equal weight and not exceeding 2500 words each due during semester (50% total), one 3 hour end of semester written examination (50%).
Prescribed Texts:	Turns S, An Introduction to Combustion - Concepts and Applications, 3rd Ed. McGraw-Hill, 2010.
Recommended Texts:	Pulkrabek W, *Engineering Fundamentals of the Internal Combustion Engine, 2nd Ed*. Prentice-Hall 2006.

	Heywood J, *Internal Combustion Engine Fundamentals*, McGraw-Hill, 1988.
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 • Understanding of social, cultural, global, and environmental responsibilities and the need to employ principles of sustainable development • Ability to utilise a systems approach to complex problems and to design and operational performance • Capacity for creativity and innovation
Related Course(s):	Bachelor of Engineering (Mechanical and Manufacturing Engineering) Bachelor of Engineering(Mechanical & Manufacturing) and Bachelor of Laws Master of Philosophy - Engineering Ph.D.- Engineering
Related Majors/Minors/ Specialisations:	Master of Engineering (Mechanical)