MCEN90026 Solid Mechanics

Credit Points:	12.5
Level:	9 (Graduate/Postgraduate)
Dates & Locations:	2015, Parkville This subject commences in the following study period/s: Semester 2, Parkville - Taught on campus.
Time Commitment:	Contact Hours: Contact hours: 36 hours of lectures and up to 30 hours of tutorials and laboratory classes. Total Time Commitment: 200 hours
Prerequisites:	

Subject	Study Period Commencement:	Credit Points:
MCEN30017 Mechanics & Materials	Semester 1	12.50

And either:

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

OR both of the following subjects:

Subject	Study Period Commencement:	Credit Points:
MAST20009 Vector Calculus	Semester 1, Semester 2	12.50
MAST20030 Differential Equations	Semester 2	12.50

MAST20030 may be taken concurrently.

Corequisites:	None
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:	Prof Peter Vee Sin Lee
Contact:	**pvlee@unimelb.edu.au (mailto:pvlee@unimelb.edu.au)**
Subject Overview:	**AIMS** This course will build on the fundamental theories defined previously in Mechanics & Materials. Two principal theories in the determination of stress within a structure are energy methods and three-dimensional analysis. **INDICATIVE CONTENT**

	Topics covered in this course will include engineering plasticity, design of pressure vessels and pipes, thick-walled cylinders, shrink fitting, duplex pressure vessels, inelastic deformation, residual stresses, membrane theory of shells of revolution, yielding, rotating shells, local bending stresses, stress analysis of rotating discs with and without holes, shrink fitting, initial and ultimate yielding, fracture mechanics and fatigue, and introduction to the finite element method.
Learning Outcomes:	**INTENDED LEARNING OUTCOMES (ILOs)** Having completed this unit the student is expected to have the skills to be able to - 1 Determine analytically, the maximum stress in a loaded beam 2 Design structures with columnar and beam elements 3 Predict failure of structures due to yielding of components 4 Utilise FEA software to solve stress analysis problems.
Assessment:	A 1 hour mid semester test (10%), assesses Intended Learning Outcomes (ILOs) 1-4. A 2 hour end of semester examination (50%), assesses ILOs 1-4. Workshop assessment task (10%), requiring 13 - 15 hours of work. Assesses ILOs 1-4. Two modelling projects of equal weight (30% total) and approximately 1000 words each to be completed between weeks 7 - 11, requiring approximately 35-40 hours work in total. Assesses ILOs 1-4.
Prescribed Texts:	None
Recommended Texts:	Gere & Timoshenko, *Mechanics of Materials* David Hutton, *Fundamentals of Finite Element Analysis* Fish & Belytschko, *A First Course in Finite Elements*
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:	On completion of this subject students should have the following skills: # Ability to apply knowledge of science and engineering fundamentals # Ability to undertake problem identification, formulation, and solution # Ability to utilise a systems approach to complex problems and to design and operational performance # Proficiency in engineering design # Capacity for lifelong learning and professional development.
Notes:	**LEARNING AND TEACHING METHODS** The subject will be delivered through a combination of lectures, workshops and tutorials. Students will also complete two computational assignments which will reinforce the material covered in lectures. **INDICATIVE KEY LEARNING RESOURCES** Students will have access to lecture notes, lecture slides and computer software. The subject LMS site also contains worked solutions for all the tutorial assignments. **CAREERS / INDUSTRY LINKS** Lectures will include stress analysis videos and examples conducted in various industries such as automotive and aerospace.
Related Majors/Minors/ Specialisations:	B-ENG Mechanical Engineering stream Master of Engineering (Mechanical with Business) Master of Engineering (Mechanical)