ENGR20004 Engineering Mechanics

Credit Points: 12.5

Level: 2 (Undergraduate)

Dates & Locations:

2015, Parkville

This subject commences in the following study period/s:
Summer Term, Parkville - Taught on campus.
Semester 1, Parkville - Taught on campus.
Semester 2, Parkville - Taught on campus.

Time Commitment: Contact Hours: 36 hours of lectures and 24 hours of labs/tutorials. Total Time Commitment: 170 hours

Prerequisites:

Postgraduate students:

Admission into an MC-ENG Master of Engineering program

Undergraduate students:

For Bachelor of Science, Bachelor of Biomedicine, and Bachelor of Commerce students

Subject	Study Period Commencement:	Credit Points:
ENGR10003 Engineering Systems Design 2	Summer Term, Semester 2	12.50

For Bachelor of Environments students (from 2013)

Subject	Study Period Commencement:	Credit Points:
ENVS10009 Structural Environments	Semester 2	12.50

Pre 2013 - ENVS10003 Constructing Environments

Corequisites: None

Recommended Background Knowledge:

Subject	Study Period Commencement:	Credit Points:
PHYC10003 Physics 1	Semester 1	12.50
MAST10006 Calculus 2	Semester 1, Semester 2	12.50
MAST10007 Linear Algebra	Summer Term, Semester 1, Semester 2	12.50

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: Dr David Ackland

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Subject Overview:	The aim of this subject is to provide an introduction to modelling the stresses and deformations that occur when axial, torsional and flexural loads are applied to a body in static equilibrium, as well as the translational and rotational motions that eventuate in a body subject to different load applications. This material will be complemented with laboratory and project based approaches to learning. The subject provides the basis for all the mechanical engineering subjects that follow. The calculations introduced in this subject are the most common type of calculations performed by professional mechanical engineers in all sectors of the industry. **INDICATIVE CONTENT** Topics to be covered include free-body diagrams; equilibrium; force systems; stresses and strains; coordinate systems; statically indeterminate systems; flexure; bending under combine loads; torsion; power transmission; kinematics; relative motion; particle kinetics; impulse and momentum; vibration; rigid body motion; angular impulse and momentum; work and energy.
Learning Outcomes:	**Intended Learning Outcomes (ILOs)** Having completed this unit the student should be able to - 1 Formulate problems in statics and dynamics by choosing suitable system boundaries and identifying relevant forces and coordinate systems 2 Analyse the equilibrium of systems of forces in two dimensions 3 Determine the loads and stresses experienced by components of common engineering structures such as trusses, frames and beams 4 Describe and analyse the motion of particles and rigid bodies using three-dimensional vectors 5 Apply the principles of impulse-momentum and work-energy to solve problems in the dynamics of simple machines and vibrating structures.
Assessment:	Two mid-semester tests (2 x 7.5% = 15%), assesses Intended Learning Outcomes (ILOs) 1-5 Weekly online quizzes (5% total), assesses ILOs 1-5 Assignments and laboratories (4 x 7.5%) due in weeks 3, 7, 10 and 12 of the semester. The total length of each assignment will not be more than 1000 words, assesses ILOs 1-5 One three hour end of semester exam (50%), assesses ILOs 1-5. The examination paper will consist of problems designed to test whether the student has acquired the ability to apply fundamental principles to the solutions of problems involving statics and dynamics. The problems set for the exam will be similar to those undertaken in the workshops. Hurdle requirement: Students must pass the exam component to pass the subject.
Prescribed Texts:	None
Recommended Texts:	Meriam JL and Kraige LG, *Engineering Mechanics : Dynamics* 7th Edition HGibbeler RC, *Statistics and Mechanics of Materials* 3rd Edition
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/2015/B-ARTS)** # **Bachelor of Commerce (https://handbook.unimelb.edu.au/view/2015/B-COM)** # **Bachelor of Music (https://handbook.unimelb.edu.au/view/2015/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 completion of the subject students are expected to have the ability to - # Apply knowledge of basic science and engineering fundamentals # Communicate effectively

	# Have in-depth technical competence in at least one engineering discipline # Undertake problem identification, formulation and solution # Function effectively as an individual and in multi-disciplinary and multi-cultural teams, with the capacity to be leader or manager as well as an effective team member.
Notes:	**INDICATIVE KEY LEARNING RESOURCES** Students will have access to lecture notes, lecture slides and workshop questions on LMS. **CAREERS / INDUSTRY LINKS** A 2 hour question and answer session with representatives from industry will be hosted for Engineering Mechanics students. **ENGR20004- 2015 summer teaching dates**: 12th Jan to 21st Feb, exam will be held during the following week.
Related Majors/Minors/ Specialisations:	B-ENG Civil Engineering stream B-ENG Electrical Engineering stream B-ENG Mechanical Engineering stream Civil (Engineering) Systems major Engineering Systems Environmental Engineering Systems major Environments Discipline subjects Master of Engineering (Civil with Business) Master of Engineering (Civil) Master of Engineering (Environmental) Master of Engineering (Mechanical with Business) Master of Engineering (Mechanical) Master of Engineering (Mechatronics) Master of Engineering (Structural) Science-credited subjects - new generation B-SCI and B-ENG. Selective subjects for B-BMED
Related Breadth Track(s):	Mechanical Engineering