MCEN90038 Dynamics

Credit Points:	12.5
Level:	9 (Graduate/Postgraduate)
Dates & Locations:	2016, Parkville This subject commences in the following study period/s: Semester 1, Parkville - Taught on campus.
Time Commitment:	Contact Hours: 36 hours of lectures, 12 hours of workshops and tutes. Total Time Commitment: Estimated 200 hours
Prerequisites:	Cannot be taken concurrently.

Subject	Study Period Commencement:	Credit Points:
ENGR20004 Engineering Mechanics	January, Semester 1, Semester 2	12.5

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 Student Support and Engagement Policy, academic requirements for this subject are articulated in the Subject Overview, Learning Outcomes, Assessment and Generic Skills sections of this entry. It is University policy to take all reasonable steps to minimise the impact of disability upon academic study, and reasonable adjustments will be made to enhance a student's participation in the University's programs. Students who feel their disability may impact on meeting the requirements of this subject are encouraged to discuss this matter with a Faculty Student Adviser and Student Equity and Disability Support: http://services.unimelb.edu.au/disability
Coordinator:	Assoc Prof Denny Oetomo
Contact:	Dr Denny Oetomo doetomo@unimelb.edu.au **MELBOURNE SCHOOL OF ENGINEERING** **Currently enrolled students:** General information: **https://ask.unimelb.edu.au (https://ask.unimelb.edu.au)** Email: enquiries-STEM@unimelb.edu.au **Future students:** Further information: **https://enquiry.app.unimelb.edu.au/ (https://enquiry.app.unimelb.edu.au/)** Email:
Subject Overview:	This subject continues from Engineering Mechanics to deepen the understanding of (momentum-based) Newtonian Mechanics. It focuses on the study of the motion of rigid bodies in 3D space in kinematics, kinetics and finally the Newton Euler approach of obtaining the equation of motion as well as collision of rigid bodies. Extension to multi-body systems is introduced in each concept. System analysis is introduced by focusing on a case study of gyroscopic motion.

	Kinematics of rigid bodies: # Non inertial coordinate systems # Rotation representation # Angular velocity and acceleration in non-inertial frame # Constraints. Rigid Body Kinetics # Kinetics of rigid bodies: # Inertia tensor, principle axis # Parallel axis theorem. Newton-Euler Approach to obtaining equation of motion. Collision of Rigid Bodies: # Impulse-momentum principle # Collision of point masses (particles) # Collision of unconstrained rigid bodies # Collision of constrained rigid bodies. Gyroscopic motion.
Learning Outcomes:	INTENDED LEARNING OUTCOMES (ILOs) Having completed this unit the student is expected to be able to: 1 Independently formulate physical and mathematical models for three-dimensional dynamic analysis of mechanical systems 2 Solve the mathematical models by means of specialised analytical and numerical methods.
Assessment:	One written 3 hour open book end of semester examination (60%). ILOs 1 to 2 addressed in the exam. The examination is a hurdle and must be passed to pass the subject. Attendance and participation in laboratory class with a written report not exceeding 10 pages, requiring 10-15 hours of work (10%). Three written assignments not exceeding 30 pages in total, in weeks 3, 5 and 7, requiring 30-35 hours work. ILOs 1-2 are addressed in these assignments.
Prescribed Texts:	None
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 the 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 an operational performance # Ability to communicate effectively, with the engineering team and with the community at large # Capacity for lifelong learning and professional development.
Related Majors/Minors/ Specialisations:	B-ENG Mechanical Engineering stream Master of Engineering (Mechanical with Business) Master of Engineering (Mechanical) Master of Engineering (Mechatronics)