BMEN30005 Introduction to Biomechanics

Credit Points:	12.5
Level:	3 (Undergraduate)
Dates & Locations:	2015, 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 tutorials; 12 hours of workshops Total Time Commitment: 170 hours
Prerequisites:	Either of the following subjects **Subject** | **Study Period Commencement:** | **Credit Points:** COMP20005 Engineering Computation | Semester 1, Semester 2 | 12.50 (if completed prior 2015) **OR** **Subject** | **Study Period Commencement:** | **Credit Points:** BMEN20001 Biomechanical Physics & Computation | 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 For students enrolled in **MC-ENG Master of Engineering (Biomedical)** or **(Biomedical with Business)**, BMEN20001 Biomechanical Physics and Computation and MAST20029 may be taken concurrently.
Corequisites:	None
Recommended Background Knowledge:	Basic knowledge of engineering mechanics, including the position, velocity and acceleration of particles and rigid bodies moving in a plane; angular velocity of a rigid body moving in a plane; free-body analysis of forces acting on a rigid body; and mechanical energy, including kinetic energy and potential energy.
Non Allowed Subjects:	BMEN30005 Biomechanics and Biotransport
Core Participation Requirements:	For the purposes of considering applications for Reasonable Adjustments under the Disability Standards for Education (Cwth 2005) and Students Experiencing Academic

	Disadvantage Policy, this subject requires all students to actively and safely participate in laboratory activities. Students who feel their disability may impact upon their participation are encouraged to discuss this with the Subject Coordinator and the Disability Liaison Unit. http://www.services.unimelb.edu.au/disability/
Coordinator:	Prof Marcus Pandy
Contact:	Email: **pandym@unimelb.edu.au (mailto:pandym@unimelb.edu.au)**
Subject Overview:	**AIMS** The main aim of this course is to introduce students to the basic concepts of the kinematics and dynamics of human motion and the architectural features and mechanical properties of musculoskeletal tissue. Tissue function is then illustrated in the context of normal and pathological movement. **INDICATIVE CONTENT** Specific topics covered include: Motion of a Rigid Body (reference frames, angular velocity, two points fixed on a rigid body); Measurement and Processing of Kinematic Data; Body Anthropometry (calculation of centre of mass and mass moment of inertia); Forces and Moments (moments of force, muscle moment arm, inverse dynamics analysis); Work, Energy, Power (kinetic energy, potential energy, elastic strain energy); Tissue Biomechanics (muscle, tendon, ligament, cartilage and bone); Orthopaedic Biomechanics: biomechanics of gait across the lifespan, biomechanical adaptations to training, knee osteoarthritis).
Learning Outcomes:	**INTENDED LEARNING OUTCOMES (ILOs)** Having completed this subject the student is expected - 1 To understand the basic concepts of mechanics and appreciate the ways in which they can be applied to the study of human movement 2 To learn about some of the common experimental methods used in biomechanics, with particular emphasis on movement 3 To understand about some of the basic principles of tissue biomechanics, especially bone, cartilage, ligament and muscle.
Assessment:	One hour and twenty minutes written test mid semester (10%) Three assignments throughout the semester (10% each) requiring approximately 15 hours of work each One written examination of two hours duration at the end of semester (60%). ILOs 1 to 3 are assessed in the final written examination, the mid-semester test, and submitted assignments.
Prescribed Texts:	Abernethy B et al. Biophysical Foundations of Human Movement. Human Kinetics.
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 completing this subject, students should have developed - # The ability to apply knowledge of science and engineering fundamentals # The ability to undertake problem identification, formulation and solution # The ability to utilise a systems approach to complex problems and to design and operational performance # Proficiency in engineering design

	# The ability to communicate effectively, with the engineering team and with the community at large # A capacity for creativity and innovation # The ability to function effectively as an individual and in multidisciplinary and multicultural teams, as a team leader or manager as well as an effective team member # A capacity for lifelong learning and professional development
Related Majors/Minors/ Specialisations:	Bioengineering Systems Master of Engineering (Biomedical with Business) Master of Engineering (Biomedical) Science-credited subjects - new generation B-SCI and B-ENG. Selective subjects for B-BMED