BMEN90029 Soft Tissue and Cellular Biomechanics

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: 48 hours including 2 hours of lectures and 2 hours of workshops per week Total Time Commitment: 200 hours
Prerequisites:	One of the following subjects -

Subject	Study Period Commencement:	Credit Points:
MAST30030 Applied Mathematical Modelling	Semester 1	12.5
BMEN30005 Introduction to Biomechanics	Semester 1	12.5
MCEN30017 Mechanics & Materials	Semester 1	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:	Dr Vijay Rajagopal
Contact:	Vijay Rajagopal **vijay.rajagopal@unimelb.edu.au (mailto:vijay.rajagopal@unimelb.edu.au)**
Subject Overview:	AIMS This subject aims to develop students' knowledge and capabilities in experimental and computational biomechanics of cells and soft-tissues. Students will apply fundamental mathematical theory of nonlinear continuum mechanics and computational approaches to solve stress-equilibrium equations. Students will learn fundamentals in cell signalling and how cell- and sub-cellular-level processes affect cell and tissue mechanical properties. These concepts will be put to practice in project-based and examination assessments. INDICATIVE CONTENT # Nonlinear continuum mechanics theory # Computational techniques for solving nonlinear mechanics problems # Soft-tissue mechanical properties # Cytoskeletal networks and mechanics # Signalling pathtways and systems-biology related to mechanics of cells and tissues

Learning Outcomes:	**Intended Learning Outcomes (ILOs)** On successful completion of this subject, students should be able to: 1 Describe the fundamental mathematical principles behind nonlinear continuum mechanics 2 Describe and construct biochemical models of cell signalling pathways that affect cell and tissue mechanics 3 Construct computational models of the mechanics of soft-tissues and cells 4 Describe how the mechanical behaviour of cells and tissues in the body are regulated by chemical and mechanical signals 5 Construct multi-scale models of mechanics and signalling in cells and tissues 6 Demonstrate skills in communicating results from engineering research in written form.
Assessment:	An assignment requiring 40-45 hours work, due in week 6 (30%). ILOs 1 and 3 will be assessed in this assignment. A project based assignment requiring 40-50 hours of work, due in week 11 or 12 (30%). ILOs 1-,6 will be assessed in this assignment. A 2 hour end-of-semester examination. ILOs 1, 2 and 4 will be assessed in the examination. HURDLE – students will need a mark of at least 50% in the end-of-semester exam to pass this subject.
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 this subject, students should have developed the following skills: # The ability to undertake problem identification, formulation and solution # Capacity for independent critical thought, rational inquiry and self-directed learning # Profound respect for truth and intellectual integrity, and for the ethics of scholarship # An ability to apply knowledge of basic science and engineering fundamentals
Related Majors/Minors/ Specialisations:	Master of Engineering (Biomedical with Business) Master of Engineering (Biomedical) Master of Engineering (Mechanical)