

ENGR90020 Advanced Topics in Mech Engineering 2

Credit Points:	12.50
Level:	9 (Graduate/Postgraduate)
Dates & Locations:	This subject is not offered in 2011.
Time Commitment:	Contact Hours: 24 hours of lectures Total Time Commitment: Estimated 120 hours
Prerequisites:	None
Corequisites:	Students must be enrolled in a PhD or Masters by Research
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
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Subject Overview:	Students will be introduced to selected topics from biomechanics, biomaterials, system biology and biorobotics. Students will also appreciate the use of Dynamic Programming, Markov Models and Optimal Control in the above areas. Students will be encouraged to develop critical and constructive thinking via reviewing the latest scientific publications as a part of an assignment to be selected from the above mentioned areas. Biomechanics will focus on the musculoskeletal system for both normal and pathological states. It will introduce quantitative methods to investigate musculoskeletal injuries and diseases (e.g. osteoporosis and osteoarthritis) and discuss the mechanical properties of bone and tissue, gait analysis and orthopaedic implant design. Biomaterials will address different materials (polymers, metals, ceramics and composites) used in contact with living tissue. A main focus in this part is to examine the application of materials in the physiological environment. Topics will include host reaction, testing and degradation of biomaterials in biological environment. System Biology will focus on the big picture discussing regulatory networks and pathways that lead to the changes in cellular and lower levels. Some aspects of Bioinformatics will also be appreciated. Biorobotics will focus of the use of robotics technology in various medical procedures, such as observation, surgical intervention, and rehabilitation / assistance. Current technological challenges will be discussed in view of the state-of-the-arts in the field today.
Objectives:	Upon completion of this subject students should be able to: <ul style="list-style-type: none"> • Formulate problems in statics and dynamics by choosing suitable system boundaries and identifying relevant forces and coordinate systems • Analyse the equilibrium of systems of forces in two and three dimensions • Determine the loads and stresses experienced by components of common engineering structures such as trusses, frames and beams • Describe and analyse the motion of particles and rigid bodies using three-dimensional vectors • Apply the principles of impulse-momentum and work-energy to solve problems in the dynamics of simple machines and vibrating structures
Assessment:	Assessment for this subject includes: Two mid-semester assignments worth 20% each. One end of semester exam worth 60%. Students are required to pass the final exam in order to pass the subject.
Prescribed Texts:	None
Recommended 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:	<p>On completion of this subject, students should have developed the following generic skills</p> <ul style="list-style-type: none">• Ability to apply knowledge of basic science and engineering fundamentals• Ability to communicate effectively, not only with engineers but also with the community at large• In-depth technical competence in at least one engineering discipline• Ability to undertake problem identification, formulation and solution;• Ability to 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