436-204 Systems Modelling

Credit Points:	12.500
Level:	Undergraduate
Dates & Locations:	2008, This subject commences in the following study period/s: Semester 2, - Taught on campus.
Time Commitment:	Contact Hours: Thirty-two hours of lectures and 16 hours of tutorials, assignments and laboratory work Total Time Commitment: Not available
Prerequisites:	(100-level mathematics - 620-141 Maths A or 620-121 Maths A (Advanced); and 620-143 Applied Maths or 620-123 Applied Maths (Advanced)), 433-171 Introduction to Programming (or equivalent), 431-101 Fundamentals of Electrical Engineering, 436-202 Mechanics 1 and 431-201 Engineering Analysis A or equivalent.
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. A.Ooi
Subject Overview:	Unit 1, Computational Mechanics: Upon completion students should be able to formulate algorithms into working computer programs in C language in order to solve engineering problems, and be aware of numerical errors inherent in many computational schemes. Topics covered include fundamentals of numerical modelling; approximation and errors; roots of equations; numerical solution of linear algebraic equations; curve fitting and splines; interpolation and extrapolation; numerical differentiation and integration; pre- and post-computational analysis; and graphical representation of results. Unit 2, Electro-mechanical Machine Behaviour: Upon completion students should be familiar with the concepts and terminology of electrical power engineering; be able to describe the construction of common electrical and mechanical power sources; understand the operating characteristics of common electrical and mechanical devices used for motive power; be able to construct time and frequency, domain models of simple electrical, mechanical, pneumatic and hydraulic engineering components and systems; and be able to compute time and frequency-domain responses of linear dynamical systems. Topics covered include DC and AC power supplies and distribution systems; inverters, transformers and rectifiers; principles and operation of single and multi-phase AC machines, induction motors, and DC machines; solid-state control of machines, principles and operation of electro-hydraulic and electro-pneumatic servo valves and actuators, system modelling; and unified approach to modelling electrical, mechanical and thermal systems, block diagrams, transfer function and state-space representations, computation of transient, steady-state time responses, harmonic frequency responses and use of Matlab for system response calculations.
Assessment:	Two 2-hour end-of-semester examinations, tutorial tests and assignments to be submitted throughout the semester. Unit 1: Computational Mechanics - Examination 30%; tutorial tests and assignments not exceeding 60 pages or equivalent 20%. Unit 2: Electro-mechanical Machine Behaviour - Examination 35%, tutorial tests and assignments not exceeding 50 pages

	or equivalent 15%.Students will have to obtain a mark of at least 40% in each of the units in order to pass the subject.
Prescribed Texts:	None
Recommended Texts:	Information Not Available
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:	# 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 utilise a systems approach to design and operational performance # ability to function effectively as an individual and in multi-disciplinary and multi-cultural teams, with the capacity to be a leader or manager as well as an effective team member # understanding of the social, cultural, global and environmental responsibilities of the professional engineer, and the need for sustainable development # understanding of professional and ethical responsibilities and commitment to them # expectation of the need to undertake lifelong learning, capacity to do so # capacity for independent critical thought, rational inquiry and self-directed learning # intellectual curiosity and creativity, including understanding of the philosophical and methodological bases of research activity # openness to new ideas and unconventional critiques of received wisdom # profound respect for truth and intellectual integrity, and for the ethics of scholarship
Notes:	This subject requires code to be written in a version of C programming language and the use of Matlab. Students may avail themselves of a pre-semester week of language tuition.
Related Course(s):	Bachelor of Engineering (EngineeringManagement)Mechanical&Manufacturing Bachelor of Engineering (Mechanical &Manufacturing) and Bachelor of Arts Bachelor of Engineering (Mechanical &Manufacturing)& Bachelor of Science Bachelor of Engineering (Mechanical &Manufacturing)/Bachelor of Commerce Bachelor of Engineering (Mechanical and Manufacturing Engineering) Bachelor of Engineering (Mechatronics) and Bachelor of Computer Science Bachelor of Engineering(Mechanical & Manufacturing) and Bachelor of Laws