431-221 Fundamentals of Signals and Systems

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-six hours of lectures, 11 hours of tutorials and 12 hours of laboratory work Total Time Commitment: Not available
Prerequisites:	431-201 Engineering Analysis A or equivalent and 431-210 Electrical Circuits 2
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
Subject Overview:	This subject introduces students to the fundamental principles of signals and systems. Signals are modelled as functions on a set. Examples include continuous time signals (audio, radio, voltages), discrete time signals (digital audio, synchronous circuits), images (discrete and continuous), discrete event signals, and sequences. Systems are modelled as mappings on signals. The notion of state is discussed in a general way. State machines are studied using block diagrams (serial, parallel and feedback compositions). Difference and differential equations are considered as models for linear, time-ivariant (LTI) systems, and these systems are first investigaged via state-space representations, impulse response and convolution. Frequency domain models for signals and frequency response for systems are then investigated, covering topics such as Fourier representations of periodic signals, continuous-time and discrete-time Fourier transforms, frequency response, filtering, transfer functions, Z-transforms, Laplace transforms, poles and zeros, Bode plots, and the relationship to state-space representations. Concepts will be illustrated by examples from control theory, signal processing and telecommunications. Students will learn how to represent and analyse signals and systems with specific properties using the MATLAB software environment. This subject provides the fundamentals for all later year signal processing, control and communications subjects.
Assessment:	Formally supervised written examination 3-hours (60%) (end of semester); written class test 1-hour (10%) (mid-semester); written assignments (10%) (4 assignments throughout semester); laboratory reports (20%) (four 3-hour laboratory classes throughout the semester.
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:	Above and beyond the technical knowledge necessary for successful completion of this subject, many generic skills will be required. On completion of this subject, the students should have developed: # a high level of problem solving and analytical skills; # a capacity to tackle unfamiliar problems, including problem identification, formulation and solution; # an ability to plan work and be efficient in time management; # hands-on skills through practical and software laboratory experiments; # a heightened sense of intellectual curiosity and creativity; # an ability to apply knowledge of basic science and engineering fundamentals; # an ability to communicate effectively, not only with engineers but also with the community at large; # an ability to utilise a systems approach to design and operational performance; # an expectation of the need to undertake lifelong learning, and a capacity to do so; # a capacity for independent critical thought, rational inquiry and self-directed learning; # respect for truth and intellectual integrity, and for the ethics of scholarship
Related Course(s):	Bachelor of Engineering (Biomedical)Biosignals Bachelor of Engineering (Computer Engineering) Bachelor of Engineering (Electrical Engineering) Bachelor of Engineering (EngineeringManagement) Computer Bachelor of Engineering (EngineeringManagement) Electrical