431-325 Stochastic Signals and Systems

Credit Points:	12.50
Level:	3 (Undergraduate)
Dates & Locations:	2009, This subject commences in the following study period/s: Semester 1, - Taught on campus.
Time Commitment:	Contact Hours: 36 hours lectures and 12 tutorials and 12 hours of practical classes Total Time Commitment: Not available
Prerequisites:	431-221 Fundamentals of Signals and Systems and 431-201 Engineering Analysis A (prior to 2001, 421-204 Engineering Analysis A) and 431-202 Engineering Analysis B (prior to 2001, 421-205 Engineering Analysis B) 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 Brian Scott Krongold
Subject Overview:	This subject builds on the concepts developed in 431-221 Fundamentals of Signals and Systems. It aims to give students basic skills in the modelling and analysis of stochastic signals and systems for the analysis and design of modern telecommunication systems and control systems. Topics include basic concepts: introduction to probability concepts; discrete and continuous random variables, and their distributional properties and moments; transformation of random variables; simulation of random variables; sums of random variables and central limit theorem; random signals in communications: random processes; stationarity; models of stochastic signals used in communications system analysis, including Gaussian processes, signal spectra and power spectral density; linear communication and control systems with stochastic inputs; poisson process; stimulation of communcation systems.
Objectives:	On completing this subject the student should be able to: 1. Define fundamental probabilistic concepts such as the axioms of probability, random variables, independence, expectation and stochastic processes; 2. List several important distribution functions and explain why they are significant; 3. Use the laws of large numbers, the central limit theorem, and inequalities to approximate and bound probabilities; 4. Analyse probabilistic models of engineering systems; 5. Formulate probabilistic models for engineering systems; 6. Use software tools (e.g. MATLAB) to simulate stochastic models of engineering systems.

Assessment:	Assessment: continuous assessment of written assignments, consisting of problem-solving exercises (15%), and computer laboratory simulations (15%), with reports not exceeding 6000 words. Two class tests of one hour duration (20%). A final 3-hour exam (50%). In addition, students are required to pass the final exam, in order to pass the subject as a whole.
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 # 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:	Credit may not be obtained for both 431-325 Stochastic Signals and Systems and 620-201 Probability.
Related Course(s):	Bachelor of Engineering (Biomedical)Biosignals Bachelor of Engineering (Computer Engineering) Bachelor of Engineering (Computer Engineering)/Bachelor of Science Bachelor of Engineering (Computer) and Bachelor of Arts Bachelor of Engineering (Computer) and Bachelor of Commerce Bachelor of Engineering (Computer) and Bachelor of Laws Bachelor of Engineering (Electrical Engineering) Bachelor of Engineering (Electrical Engineering)/Bachelor of Science Bachelor of Engineering (Electrical) and Bachelor of Arts Bachelor of Engineering (Electrical) and Bachelor of Commerce Bachelor of Engineering (Electrical) and Bachelor of Laws Bachelor of Engineering (EngineeringManagement) Computer Bachelor of Engineering (EngineeringManagement) Electrical