

ELEN90054 Probability and Random Models

Credit Points:	12.50																										
Level:	9 (Graduate/Postgraduate)																										
Dates & Locations:	This subject is not offered in 2013.																										
Time Commitment:	Contact Hours: 36 hours of lectures, 12 hours of tutorials and 12 hours of workshops Total Time Commitment: 120 hours																										
Prerequisites:	<p>GRADUATE STUDENTS: Enrolment in Master of Engineering (Electrical, Biomedical or Mechatronics)</p> <p>UNDERGRADUATE STUDENTS:</p> <table border="1"> <thead> <tr> <th>Subject</th> <th>Study Period Commencement:</th> <th>Credit Points:</th> </tr> </thead> <tbody> <tr> <td>MAST10006 Calculus 2</td> <td>Not offered 2013</td> <td>12.50</td> </tr> </tbody> </table> <p>OR</p> <table border="1"> <thead> <tr> <th>Subject</th> <th>Study Period Commencement:</th> <th>Credit Points:</th> </tr> </thead> <tbody> <tr> <td>MAST10009 Accelerated Mathematics 2</td> <td>Not offered 2013</td> <td>12.50</td> </tr> </tbody> </table> <p>AND</p> <table border="1"> <thead> <tr> <th>Subject</th> <th>Study Period Commencement:</th> <th>Credit Points:</th> </tr> </thead> <tbody> <tr> <td>MAST10007 Linear Algebra</td> <td>Not offered 2013</td> <td>12.50</td> </tr> </tbody> </table> <p>OR</p> <table border="1"> <thead> <tr> <th>Subject</th> <th>Study Period Commencement:</th> <th>Credit Points:</th> </tr> </thead> <tbody> <tr> <td>MAST10008 Accelerated Mathematics 1</td> <td>Not offered 2013</td> <td>12.50</td> </tr> </tbody> </table>			Subject	Study Period Commencement:	Credit Points:	MAST10006 Calculus 2	Not offered 2013	12.50	Subject	Study Period Commencement:	Credit Points:	MAST10009 Accelerated Mathematics 2	Not offered 2013	12.50	Subject	Study Period Commencement:	Credit Points:	MAST10007 Linear Algebra	Not offered 2013	12.50	Subject	Study Period Commencement:	Credit Points:	MAST10008 Accelerated Mathematics 1	Not offered 2013	12.50
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Corequisites:	None																										
Recommended Background Knowledge:	<p>Knowledge in one of the following subjects is recommended</p> <table border="1"> <thead> <tr> <th>Subject</th> <th>Study Period Commencement:</th> <th>Credit Points:</th> </tr> </thead> <tbody> <tr> <td>ELEN30012 Signals and Systems</td> <td>Semester 2</td> <td>12.50</td> </tr> <tr> <td>BMEN30006 Fundamentals of Biosignals</td> <td>Not offered 2013</td> <td>12.50</td> </tr> </tbody> </table>			Subject	Study Period Commencement:	Credit Points:	ELEN30012 Signals and Systems	Semester 2	12.50	BMEN30006 Fundamentals of Biosignals	Not offered 2013	12.50															
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Non Allowed Subjects:	<p>Anti-requisite for this subject is:</p> <table border="1"> <thead> <tr> <th>Subject</th> <th>Study Period Commencement:</th> <th>Credit Points:</th> </tr> </thead> <tbody> <tr> <td>ELEN30002 Stochastic Signals and Systems</td> <td>Not offered 2013</td> <td>12.50</td> </tr> </tbody> </table>			Subject	Study Period Commencement:	Credit Points:	ELEN30002 Stochastic Signals and Systems	Not offered 2013	12.50																		
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Core Participation Requirements:	For the purposes of considering applications for Reasonable Adjustments under the Disability Standards for Education (Cwth 2005) and Students Experiencing Academic Disadvantage Policy, this subject requires all students to actively and safely participate in laboratory activities. Students who feel their disability may impact upon their participation are																										

	encouraged to discuss this with the Subject Coordinator and the Disability Liaison Unit. http://www.services.unimelb.edu.au/disability/
Contact:	Email: gnair@unimelb.edu.au (mailto:gnair@unimelb.edu.au)
Subject Overview:	<p>This subject provides an introduction to probability, random variables, estimation and stochastic processes. The material covered is important in fields such as electronic, electrical and computer networks, communications, control and signal processing. Students will study topics including:</p> <ul style="list-style-type: none"> # Foundations – combinatorial analysis, axioms of probability, conditional probability, independence; # Random variables – definition, distribution functions, density functions, expected value, functions of a random variable, and important distributions; # Multiple random variables – joint distribution and density functions, independent random variables, conditional distributions, functions of several random variables, and jointly Gaussian random variables; # Expectation, sums, inequalities and limit theorems – sums of random variables, conditional expectation, moment generating functions, Markov and Chebychev inequalities, weak and strong laws of large numbers, and the central limit theorem; # Detection and estimation – hypothesis testing; maximum likelihood and maximum a posteriori rules, and minimum mean squared error estimation (MMSE); # Stochastic processes – definition, correlation, strict and wide-sense stationarity, ergodicity, important random processes, and simple Markov chains. <p>This material is complemented by exposure to examples from electrical engineering and software tools (e.g. MATLAB) for computation and simulations.</p>
Objectives:	<p>On completing this subject the student should be able to:</p> <ul style="list-style-type: none"> # Define fundamental probabilistic concepts such as the axioms of probability, random variables, independence, expectation and stochastic processes; # List several important distribution functions and explain why they are significant; # Use the laws of large numbers, the central limit theorem, and inequalities to approximate and bound probabilities; # Analyse probabilistic models of engineering systems; # Formulate probabilistic models for engineering systems.
Assessment:	One written examination, not exceeding three hours at the end of semester worth 60% (must pass written exam to pass subject); Continuous assessment of submitted project work, not exceeding 30 pages over the semester, worth 30%; A one-hour mid-semester test, worth 10%.
Prescribed Texts:	Probabaility and Stochastic Processes, Yates and Goodman
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:	<ul style="list-style-type: none"> # Ability to apply knowledge of basic science and engineering fundamentals # 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 # Capacity for independent critical thought, rational inquiry and self-directed learning # Ability to communicate effectively, with the engineering team and with the community at large
Related Course(s):	Postgraduate Certificate in Engineering
Related Majors/Minors/Specialisations:	B-ENG Electrical Engineering stream Master of Engineering (Biomedical) Master of Engineering (Electrical)