ELEN90057 Communication Systems

Credit Points:	12.5
Level:	9 (Graduate/Postgraduate)
Dates & Locations:	2015, Parkville This subject commences in the following study period/s: Semester 2, Parkville - Taught on campus.
Time Commitment:	Contact Hours: 3 x one hour lectures; up to 12 hours of tutorials; and up to 18 hours of workshops Total Time Commitment: 200 hours
Prerequisites:	Prerequisites for this subject are: **Subject** / **Study Period Commencement:** / **Credit Points:** ELEN30012 Signals and Systems / Semester 2 / 12.50 AND One of the following subjects: **Subject** / **Study Period Commencement:** / **Credit Points:** ELEN90054 Probability and Random Models / Semester 1 / 12.50 MAST30020 Probability for Inference / Semester 1 / 12.50 MAST30001 Stochastic Modelling / Semester 2 / 12.50
Corequisites:	None
Recommended Background Knowledge:	None
Non Allowed Subjects:	Anti-requisite for this subject is: **Subject** / **Study Period Commencement:** / **Credit Points:** ELEN30003 Communication Systems / Not offered 2015 / 12.50
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:	Prof William Shieh
Contact:	Email: **shiehw@unimelb.edu.au (mailto:shiehw@unimelb.edu.au)**
Subject Overview:	**AIMS** This subject provides an introduction to the analysis and design of telecommunication signals and systems, in the presence of uncertainty. The emphasis is on understanding the basic

	concepts that underpin both analog and digital formats. The material covered is crucial to understanding how modern wired and wireless communication systems work at the physical layer. This is a core subject for the Master of Engineering (Electrical) course. **INDICATIVE CONTENT** Topics to be covered include: # Transmission through linear time-invariant channels; magnitude and phase distortion; basic equalisation; low-pass representations of band-pass signals and systems; group and phase delays # Time- and frequency-domain analysis of analog modulation and demodulation schemes, including conventional amplitude modulation (AM), double sideband suppressed carrier (DSBSC), single sideband, and frequency modulation (FM); threshold effects in AM and FM # Random processes in frequency domain; signal-to-noise ratios (SNR's) in DSBSC, AM and FM # Nyquist's sampling theorem; quantisation and signal-to-quantisation noise ratios # Digital modulation schemes including baseband pulse amplitude modulation, amplitude-shift keying and frequency-shift keying, synchronisation, matched filter receivers for additive white Gaussian noise channels, bit-error rate analysis; # Comparisons of analog and digital schemes in terms of spectral efficiency, transmission power, demodulated SNR and complexity.
Learning Outcomes:	**INTENDED LEARNING OUTCOMES (ILO)** Having completed this subject it is expected that the student be able to: 1 Qualitatively describe the basic functional blocks of a telecommunication system and their attributes 2 Quantitatively analyse the overall performance of analog and digital communication schemes, in terms of signal-to-noise ratios, transmission bandwidth 3 Assess the relative merits of different modulation and demodulation techniques, and make design choices on this basis 4 Use software and hardware simulation tools to understand the properties and performance of simple communication systems
Assessment:	One written examination, not exceeding three hours at the end of semester, worth 70% Continuous assessment of submitted workshop reports, not exceeding 20 pages over the semester (approximately 25-30 hours of work per student), worth 20% A one-hour mid-semester test, worth 10%. Hurdle requirement: Students must pass the written exam to pass the subject. Intended Learning Outcomes (ILOs) 1 to 3 are assessed via the mid-semester test and final examination. ILO 4 is assessed through the workshop reports.
Prescribed Texts:	TBA
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 # 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
Notes:	**LEARNING AND TEACHING METHODS** The subject is delivered through lectures, tutorials and workshop classes. **INDICATIVE KEY LEARNING RESOURCES** The subject is delivered through lectures, tutorials and workshop classes. **CAREERS / INDUSTRY LINKS**

	Exposure to simulation and measurement tools and teamwork through the five workshops.
Related Majors/Minors/ Specialisations:	B-ENG Electrical Engineering stream Master of Engineering (Electrical with Business) Master of Engineering (Electrical)