

ELEN90007 Wireless Communication Systems

Credit Points:	12.5												
Level:	9 (Graduate/Postgraduate)												
Dates & Locations:	2016, Parkville This subject commences in the following study period/s: Semester 2, Parkville - Taught on campus.												
Time Commitment:	Contact Hours: 1 x 3 hour lecture per week Total Time Commitment: 200 hours.												
Prerequisites:	<p>Enrolment in the 364AA Master of Telecommunications Engineering</p> <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>ELEN90051 Advanced Communication Systems</td> <td>Semester 1</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>ELEN40003 Digital Communications</td> <td>Not offered 2016</td> <td>12.50</td> </tr> </tbody> </table>	Subject	Study Period Commencement:	Credit Points:	ELEN90051 Advanced Communication Systems	Semester 1	12.50	Subject	Study Period Commencement:	Credit Points:	ELEN40003 Digital Communications	Not offered 2016	12.50
Subject	Study Period Commencement:	Credit Points:											
ELEN90051 Advanced Communication Systems	Semester 1	12.50											
Subject	Study Period Commencement:	Credit Points:											
ELEN40003 Digital Communications	Not offered 2016	12.50											
Corequisites:	None												
Recommended Background Knowledge:	None												
Non Allowed Subjects:	Credit may not be obtained for both ELEN90007 Wireless Communication Systems and ELEN40008 (431-465) Wireless Communication												
Core Participation Requirements:	For the purposes of considering request for Reasonable Adjustments under the Disability Standards for Education (Cwth 2005), and Students Experiencing Academic Disadvantage Policy, academic requirements for this subject are articulated in the Subject Description, Subject Objectives, Generic Skills and Assessment Requirements of this entry. The University is dedicated to provide support to those with special requirements. Further details on the disability support scheme can be found at the Disability Liaison Unit website: http://www.services.unimelb.edu.au/disability/												
Coordinator:	Prof William Shieh												
Contact:	Prof William Shieh Email: shiehw@unimelb.edu.au (mailto:shiehw@unimelb.edu.au)												
Subject Overview:	<p>AIMS</p> <p>This subject covers the fundamental design and performance issues associated with the physical and media access control of wireless networks.</p> <p>INDICATIVE CONTENT</p> <p>Topics include:</p> <ul style="list-style-type: none"> # Wireless RF link basics (antenna characterisation, polarisation, EIRP, propagation loss) # Principles of cellular mobile radio systems (cells and frequency reuse, handover, cell splitting, sectorisation) # Characterisation and modelling of wireless channels (small scale fading including multipath channels, large scale fading) 												

	<ul style="list-style-type: none"> # Link budgets # Modulation methods (linear, non-linear, single-carrier, multi-carrier OFDM) # Duplexing methods (time-division, frequency-division) # Multiple access methods (frequency-division, time-division, code-division, space-division and orthogonal-frequency-division multiple access), contention and non-contention methods # Equalisation techniques (linear, non-linear, time-domain, frequency domain) # Lowpass Representation of Bandpass Signals and Systems # Channel coding for error control (block codes, convolutional codes, turbo codes, LDPC), automatic repeat request (ARQ) protocols, hybrid ARQ protocols including incremental redundancy) # Interleaving # Diversity techniques (space diversity, frequency diversity, time diversity, multi-user diversity) and combining techniques # Multiple antenna technologies (transmit and receive diversity, space-time block codes, beamforming, spatial multiplexing, MIMO) # Transmission of digital signals over fading channels # Introduction to cellular mobile technologies (GSM/GPRS/EDGE, WCDMA / HSPA and LTE). Students will undertake a wireless project, such as network design, or analysis.
Learning Outcomes:	<p>INTENDED LEARNING OUTCOMES (ILO's)</p> <p>On completion of this subject students should have developed the skills and knowledge to understand</p> <ol style="list-style-type: none"> 1 The design and performance of the physical and media access control layers of mobile wireless systems; 2 The ability to undertake analysis and assessment of mobile wireless systems; and 3 They should have a solid understanding of: <ul style="list-style-type: none"> # Basics of RF links # Principles of cellular mobile radio systems # Characterisation and modelling of wireless channels for both small scale and large scale fading, including multipath channels # Signal processing techniques used in the physical and media access control layers of the radio interface which includes; modulation, multiple access, duplexing, channel coding, interleaving, diversity, equalisation, and multiple antenna systems # Wireless standards such as GSM/GPRS/EDGE, WCDMA/HSPA and LTE mobile technologies.
Assessment:	<p>Formally supervised 3 hour written examination in the form of a summative exam - end of semester, 70%; Three homework assignments in the form of a formative assessment throughout the semester, not exceeding 30 pages over the semester (approximately 40-45 hours of work per student), worth 30%. Hurdle requirement: Students must pass the written exam to pass the subject. Intended Learning Outcomes (ILO's) 1 to 3 are assessed in the final written examination, and submitted reports for three assignments.</p>
Prescribed Texts:	TBA
Recommended Texts:	<p>References (suggested, not mandatory)</p> <ul style="list-style-type: none"> • F. Molisch, Wireless Communications, John Wiley & Sons, 2005 • T. S. Rappaport, Wireless Communications, Principles & Practice, Prentice-Hall
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:	<p>On completion of this subject, the students should have developed the following skills:</p> <ul style="list-style-type: none"> # Problem solving and analytical skills, # Critical and creative thinking, with an aptitude for continued self-directed learning;

	<ul style="list-style-type: none"> # Sense of intellectual curiosity; # Ability to interpret data and research results; # Ability to learn in a range of ways, including through information and communication technologies; # Capacity to confront unfamiliar problems; # Ability to evaluate and synthesise the research and professional literature; # Ability to develop models of practical applications and evaluate their performance by rigorous analytical means.
<p>Notes:</p>	<p>INDICATIVE KEY LEARNING RESOURCES</p> <p>Students are provided with lecture slides, worked problem sets, and assignment specifications, and reference text lists.</p> <p>LEARNING AND TEACHING METHODS</p> <p>The subject is delivered through lectures.</p> <p>CAREERS / INDUSTRY LINKS</p> <p>This subject in conjunction with other subjects such as Advanced Communication Systems and Mobile and Wireless Networks, prepares the students for careers in mobile and wireless communications.</p> <p>Relevant Societies for Professional and Career Development:</p> <p>Engineers Australia</p> <p>IEEE Communications Society</p> <p>IEEE Microwave Theory and Techniques Society</p> <p>IEEE Networks Society</p> <p>TSA – Telecommunications Society of Australia</p>
<p>Related Course(s):</p>	<p>Master of Telecommunications Engineering</p>