

# ELEN90007 Wireless Communication Systems

<b>Credit Points:</b>	12.50												
<b>Level:</b>	9 (Graduate/Postgraduate)												
<b>Dates &amp; Locations:</b>	This subject is not offered in 2013.												
<b>Time Commitment:</b>	Contact Hours: 1X3 hour lecture per week Total Time Commitment: 120 hours.												
<b>Prerequisites:</b>	<p>Enrolment in 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>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>ELEN40003 Digital Communications</td> <td>Not offered 2013</td> <td>12.50</td> </tr> </tbody> </table>	Subject	Study Period Commencement:	Credit Points:	ELEN90051 Advanced Communication Systems	Not offered 2013	12.50	Subject	Study Period Commencement:	Credit Points:	ELEN40003 Digital Communications	Not offered 2013	12.50
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ELEN90051 Advanced Communication Systems	Not offered 2013	12.50											
Subject	Study Period Commencement:	Credit Points:											
ELEN40003 Digital Communications	Not offered 2013	12.50											
<b>Corequisites:</b>	None												
<b>Recommended Background Knowledge:</b>	None												
<b>Non Allowed Subjects:</b>	Credit may not be obtained for both ELEN90007 Wireless Communication Systems and ELEN40008(431-465) Wireless Communication												
<b>Core Participation Requirements:</b>	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: <a href="http://www.services.unimelb.edu.au/disability/">http://www.services.unimelb.edu.au/disability/</a>												
<b>Contact:</b>	Email: William Shieh <a href="mailto:shiehw@unimelb.edu.au">shiehw@unimelb.edu.au</a> (mailto:shiehw@unimelb.edu.au)												
<b>Subject Overview:</b>	<p>This subject covers the fundamental design and performance issues associated with the physical and media access control of wireless networks. Topics include:</p> <ul style="list-style-type: none"> <li># Wireless RF link basics (antenna characterisation, polarisation, EIRP, propagation loss)</li> <li># Principles of cellular mobile radio systems (cells and frequency reuse, handover, cell splitting, sectorisation)</li> <li># Characterisation and modelling of wireless channels (small scale fading including multipath channels, large scale fading)</li> <li># Link budgets</li> <li># Modulation methods (linear, non-linear, single-carrier, multi-carrier OFDM)</li> <li># Duplexing methods (time-division, frequency-division)</li> <li># Multiple access methods (frequency-division, time-division, code-division, space-division and orthogonal-frequency-division multiple access), contention and non-contention methods</li> <li># Equalisation techniques (linear, non-linear, time-domain, frequency domain)</li> <li># Channel coding for error control (block codes, convolutional codes, turbo codes, LDPC), automatic repeat request (ARQ) protocols, hybrid ARQ protocols including incremental redundancy)</li> <li># Interleaving</li> </ul>												

	<ul style="list-style-type: none"> <li># Diversity techniques (space diversity, frequency diversity, time diversity, multi-user diversity) and combining techniques</li> <li># Multiple antenna technologies (transmit and receive diversity, space-time block codes, beamforming, spatial multiplexing, MIMO)</li> <li># Transmission of digital signals over fading channels</li> <li># Introduction to cellular mobile technologies (GSM/GPRS/EDGE, WCDMA / HSPA and LTE)</li> </ul> <p>Students will undertake a wireless project, such as network design, or analysis.</p>
<b>Objectives:</b>	<p>On completion of this subject students should have developed the skills and knowledge to understand the design and performance of the physical and media access control layers of mobile wireless systems, and the ability to undertake analysis and assessment of mobile wireless systems. Specifically, they should have a solid understanding of</p> <ul style="list-style-type: none"> <li># Basics of RF links</li> <li># Principles of cellular mobile radio systems</li> <li># Characterisation and modelling of wireless channels for both small scale and large scale fading, including multipath channels</li> <li># 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</li> <li># GSM/GPRS/EDGE, WCDMA/HSPA and LTE mobile technologies</li> </ul>
<b>Assessment:</b>	Formally supervised 3 hour written examination - end of semester (70%). A student must pass the exam to pass the subject. Three homework assignments throughout the semester (30%)
<b>Prescribed Texts:</b>	TBA
<b>Recommended Texts:</b>	<p>References (suggested, not mandatory)</p> <ul style="list-style-type: none"> <li>• F. Molisch, Wireless Communications, John Wiley &amp; Sons, 2005</li> <li>• T. S. Rappaport, Wireless Communications, Principles &amp; Practice, Prentice-Hall</li> </ul>
<b>Breadth Options:</b>	This subject is not available as a breadth subject.
<b>Fees Information:</b>	Subject EFTSL, Level, Discipline & Census Date, <a href="http://enrolment.unimelb.edu.au/fees">http://enrolment.unimelb.edu.au/fees</a>
<b>Generic Skills:</b>	<p>On completion of this subject, the students should have developed:</p> <ul style="list-style-type: none"> <li># Problem solving and analytical skills,</li> <li># Critical and creative thinking, with an aptitude for continued self-directed learning;</li> <li># Sense of intellectual curiosity;</li> <li># Ability to interpret data and research results;</li> <li># Ability to learn in a range of ways, including through information and communication technologies;</li> <li># Capacity to confront unfamiliar problems;</li> <li># Ability to evaluate and synthesise the research and professional literature;</li> <li># Ability to develop models of practical applications and evaluate their performance by rigorous analytical means;</li> </ul>
<b>Related Course(s):</b>	<p>Bachelor of Engineering (Electrical Engineering)          Bachelor of Engineering (Electrical) and Bachelor of Arts          Bachelor of Engineering (Electrical) and Bachelor of Commerce          Bachelor of Engineering (EngineeringManagement) Electrical          Master of Telecommunications Engineering          Postgraduate Certificate in Engineering</p>