



University of Tehran
School of Electrical and Computer Engineering

Course:	8101670 – Wireless Multimedia Communications		
Course type:	Required	EE*	Credit: 3
Level:	Undergraduate		
Co-requisite(s):	None		
Prerequisite(s):	ECE5451 Communication Systems II		
Prerequisite by topic:			
Textbook(s):	<ol style="list-style-type: none"> 1. K. Sayood, <i>Introduction to Data Compression</i>, Prentice Hall 2004. 2. A. Goldsmith, <i>Wireless Communications</i>, Cambridge University Press, 2005. 3. J. G. Proakis, M. Salehi, <i>Digital Communications</i>, M. Salehi, McGraw Hill, 2008. 		
Coordinator:	Farshad Lahouti, Associate Professor		
Goals:	<p>The course is intended for senior undergraduate students. It provides an overview of wireless communications for efficient and robust multimedia transmission. An overview of source coding (compression) techniques for data and multimedia is presented. Methods of error correction and detection for communications over wireless (noisy) channels are introduced. The characteristics of the wireless channel and the concept of cellular communications are presented. Techniques for multi-user communication in cellular networks, i.e., Time Division Multiple Access, Frequency Division Multiple Access and Code Division Multiple Access are investigated. This course complements Digital Communications 2.</p>		
Outcome:	<p>Upon successful completion of the course, students will be able to</p> <ol style="list-style-type: none"> 1. Obtain a fundamental view of wireless communication systems building blocks 2. Understand lossy and lossless source coding algorithms and their role in communications systems 3. Understand speech, image and video coding standards and algorithms 4. Acquire basic knowledge on error correction and detection, binary channel coding and decoding techniques and retransmission (ARQ) mechanisms 5. Acquire fundamental knowledge on wireless channel, spectrum allocation and wireless channel degradations 6. Acquire fundamental knowledge on different centralized multiple 		

	access techniques in wireless communications and their receivers 7. Become acquainted with wireless cellular communications architectures and related standards						
Topics:	<ol style="list-style-type: none"> 1. Introduction 2. Source Coding 1: Data Compression Quantization (uniform and non-uniform, scalar and vector, adaptive, differential, and predictive techniques), Huffman codes, Arithmetic codes, Transform coding. 3. Source Coding 2: Multimedia Compression Speech, image and video coding standards 4. Error Control Coding Linear block codes and syndrome decoding, Cyclic codes and error detection, Convolutional codes and Viterbi decoding, Retransmission mechanisms (Automatic Repeat reQuest) 5. Wireless Channel Spectrum allocation and applications, path loss, shadowing, narrowband fading 6. Multiple Access Techniques TDMA, FDMA, Spread spectrum communications, frequency-hopping spread spectrum, direct sequence code division multiple access, CDMA receivers 7. Cellular Systems Cellular architecture, Frequency planning, Channel allocation, Hand-off, Interference, Wireless cellular standards 						
Computer usage:	MATLAB for implementing algorithms in assignments						
Assignments:	The course includes regular assignments and computer assignments						
Projects:	None						
Grading:	<table style="width: 100%; border: none;"> <tr> <td style="width: 60%;">Assignments:</td> <td style="text-align: right;">20%</td> </tr> <tr> <td>Midterm:</td> <td style="text-align: right;">35%</td> </tr> <tr> <td>Final exam:</td> <td style="text-align: right;">45%</td> </tr> </table>	Assignments:	20%	Midterm:	35%	Final exam:	45%
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Final exam:	45%						
Further readings:	<ol style="list-style-type: none"> 1. P. Mohana Shankar, <i>Introduction to Wireless Systems</i>, John Wiley & Sons, 2002. 2. T. S. Rappaport, <i>Wireless Communications: Principles and Practice</i>, Upper Saddle River, NJ: Prentice Hall 1996. 3. S. Haykin, <i>Digital Communications</i>, New York: Prentice Hall, 1988. 						
Prepared by:	Farshad Lahouti						
Date:	October 2012						

*EE: Electrical Engineering CE: Computer Engineering IT: Information Technology