



**University of Tehran**  
**School of Electrical and Computer Engineering**

<b>Course:</b>	<b>8101141– Digital Communications Laboratory</b>									
<b>Course type:</b>	EE*						CE*			Credit: 3
	Com	E	P	B	Con	D	SW	HW	IT	
	Required	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	Elective	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>Level:</b>	Undergraduate <input checked="" type="checkbox"/> Graduate <input type="checkbox"/>									
<b>Co-requisite(s):</b>	None.									
<b>Prerequisite(s):</b>	Digital Communications II (8101355).									
<b>Prerequisite by topic:</b>	Familiarity with Matlab, basic theory of digital communication and signals and systems concepts.									
<b>Textbook(s):</b>	[1] Lab Manual to prepared by director of Lab. [2] J. G. Proakis , M. Salehi and G. Bauch, <i>Contemporary Communication Systems Using Matlab</i> , 3rd Edition, CL Engineering, 2012.									
<b>Coordinator:</b>	A. Olfat, Associate Professor, School of ECE									
<b>Goals:</b>	This lab focuses on implementation of digital communication systems and related practical considerations. This lab puts the theories that students have learned into practice and help them to get a better understanding of basics of digital receiver and transmitters.									
<b>Outcome:</b>	Upon successful completion of the course, students will be able <ol style="list-style-type: none"> <li>1. Understand building blocks of digital communication systems.</li> <li>2. Understand the practical issues related to baseband processing of digital receivers.</li> <li>3. Capability to test and measure digital communication transmitter and receiver parameters.</li> <li>4. Understand the practical considerations of different modulation schemes.</li> <li>5. Understand and analyze different optimal and suboptimal detectors and complexity-quality trade-off.</li> <li>6. Understand practical limitations of digital receivers and transmitters related to bandwidth, rate and complexity.</li> <li>7. Understand practical issues concerning signal design for bandwidth limited channels and spectrum shaping</li> </ol>									

<b>Topics:</b>	<p>1-Implementation and comparison of different modulation schemes such as M-PSK, M-QAM, FSK, MSK,CPM.</p> <p>2-Spectrum analysis of different modulation schemes.</p> <p>3-Correlator and matched filter implementation of optimal receivers in AWGN.</p> <p>4-Implementation of RF and IF filters for digital receivers.</p> <p>5-Signal design for band limited channels for zero-ISI.</p> <p>6-EYE diagram analysis for ISI channels.</p> <p>7-Symbol and phase synchronization algorithms for digital communication systems.</p>
<b>Computer usage:</b>	MATLAB
<b>Assignments:</b>	8-10 reports
<b>Projects:</b>	None.
<b>Grading:</b>	<p>Reports: 50%</p> <p>Quiz: 10%</p> <p>Final exam: 40%</p>
<b>Further readings:</b>	<p>[1] D. Derickson and M. Mulleri, <i>Digital Communications Test and Measurement</i>, , Prentice-Hall, 2008.</p> <p>[2] J. G. Proakis and M. Salehi, <i>Communication Systems Engineering</i>, 2nd Edition, Prentice-Hall, 2002.</p> <p>[3] J. G. Proakis and M. Salehi, <i>Digital Communications</i>, 5<sup>th</sup> Edition, McGraw-Hill, 2008.</p>
<b>Prepared by:</b>	Ali Olfat
<b>Date:</b>	December 9, 2017.

<b>*EE: Electrical Engineering</b>		<b>CE: Computer Engineering</b>	
Com	Communications	SW	Software
E	Electronics	HW	Hardware
P	Power	IT	Information Technology
B	Bioelectronics		
Con	Control		
D	Digital System		