



University of Tehran
School of Electrical and Computer Engineering

Course:	8101366 – Communication Circuit									
Course type:	EE*						CE*			Credit: 3
	Com	E	P	B	Con	D	SW	HW	IT	
	Required	<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"/>	
	Elective	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Level:	Undergraduate <input checked="" type="checkbox"/> Graduate <input type="checkbox"/>									
Co-requisite(s):	Electronics III									
Prerequisite(s):	Communication System I									
Prerequisite by topic:	<ol style="list-style-type: none"> 1. Semiconductor devices and their high frequency models, 2. Single and multistage amplifiers, 3. Frequency response of feedback amplifiers, 4. Push-pull amplifier, 5. Differential pairs, 6. Frequency selective networks and transformers, 7. Fourier and spectrum analysis. 									
Textbook(s):	<ol style="list-style-type: none"> [1] K. K. Clarke and D. T. Hess, Communication Circuits: Analysis and Design. New York: Addison Wesley, 1971. [3] H. L. Krauss, C. W. Bostian, and F. H. Raab, Solid State Radio Engineering. USA: Wiley, 1980. [5] B. Razavi, RF Microelectronics. New York: Prentice-Hal, 1998. [6] T. H. Lee, 2nd Ed. The Design of CMOS Radio-Frequency Integrated Circuits. USA: Cambridge, 2004. [8] W. Alan Davis, Radio Frequency Circuit Design. 2001 									
Coordinator:	Professor Mahmoud Kamarei									
Goals:	<p>Presentation of fundamental analysis and design techniques for subsystem modern communication circuits covering the frequency range up to microwave.</p> <ul style="list-style-type: none"> • Overview of communication systems, modulation and detection schemes, transceiver architectures, noise, sensitivity, dynamic range, nonlinearity and distortion, low noise amplifiers, mixers, oscillators, phase-locked loops, frequency synthesizers and power amplifiers. 									
Outcome:	<p>Upon successful completion of the course, students will be able to:</p> <ol style="list-style-type: none"> 1. Design, analyze, and simulate communication systems buildingblocks such as oscillator, mixer, power amplifiers, synthesizer, 									

	<p>phase locked loops, etc.</p> <p>2. Design and analyze communication systems: receivers and transmitters</p> <p>3. Understand modulation and detection</p>												
Topics:	<ol style="list-style-type: none"> 1. An Overview of Communication Systems and Circuits, 2. Oscillator Principles and Circuits (Linear and Non-linear Operation), 3. Mixer Fundamentals and Circuits, 4. Phase Locked Loops, 5. RF & Small Signal Amplifiers, 6. Noise, 7. Power Amplifiers, 8. Modulator and Detectors. 												
Computer usage:	Students must work with circuit simulation software: Advanced Design System (ADS) and HSpice.												
Assignments:	5 to 7 homework – 3 Quiz												
Projects:	Study one of the recent developments in communication circuits and systems, and reporting outcome.												
Grading:	<table style="width: 100%; border: none;"> <tr> <td>Assignments:</td> <td style="text-align: right;">10%</td> </tr> <tr> <td>Computer Assignments</td> <td style="text-align: right;">10%</td> </tr> <tr> <td>Quiz:</td> <td style="text-align: right;">10%</td> </tr> <tr> <td>Final Project:</td> <td style="text-align: right;">10%</td> </tr> <tr> <td>Midterm exams:</td> <td style="text-align: right;">30%</td> </tr> <tr> <td>Final exam:</td> <td style="text-align: right;">30%</td> </tr> </table>	Assignments:	10%	Computer Assignments	10%	Quiz:	10%	Final Project:	10%	Midterm exams:	30%	Final exam:	30%
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Further readings:	<p>[1] J. Everard, Fundamentals of RF Circuit Design: with Low Noise</p> <p>[2] Oscillators. 2001.</p> <p>[3] D. R. Stephens, Phase locked Loops for Wireless Communications:</p> <p>[4] Digital, Analog and Optical Implementation. 2002.</p> <p>[5] S. C. Cripps, Advanced Techniques in RF Power Amplifier Design.</p> <p>[6] 2002.</p> <p>[7] J. Laskar, B. Matinpour, and S. Chakraborty, Modern Receiver</p> <p>[8] Front-Ends: Systems, Circuits, and Integration. 2004.</p>												
Prepared by:	Professor Mahmoud Kamarei												
Date:	November 10, 2014												

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