

Zarqa University

Faculty of Engineering Technology

Department: Electrical Engineering  
Course title: Digital Communication  
904476



Prerequisite: 904472+904303

Instructor: Prof. Taiseer Alghanim

Lecture's time: 9:00-10:00, Sun.-Tuse.-  
Thur. L210

Semester: Spring 2016-2017

Office Hours: S: 1:00-2:00, M: 11:00-  
12:00, TH: 12:00-1:00, or by  
appointment

### Course description:

Sampling theorem; PCM; DPCM; Delta modulation; TDM; Line coding; Matched filter; Baseband transmission: ISI; Nyquist criteria; Equalization; Binary bandpass transmission: BASK, BFSK, BPSK and DPSK modulators demodulators; Correlation receivers and Noise performance (BER); M-ary digital transmission and signal constellations; Bandwidth efficiency; Synchronization.

### Course Learning Outcomes (CLOs):

- 1- **Apply** the sampling theorem
- 2- **Design** PCM system with various line codes.
- 3- **Explain** the digital multiplexing and hierarchy standard..
- 4- **Design** the baseband digital channel for free ISI.
- 5- **Derive** the BER of the binary PCM wave using the matched filter receiver.
- 6- **Explain** the binary digital modulation schemes and the required BW; ASK, FSK, PSK, and DPSK..
- 7- **Calculate** the BER using the matched filter receiver for the different binary digital modulation schemes.
- 8- **Explain** the M-Ary digital modulation schemes and **calculate** the BER performance in the presence of AWQN.

### Course structures:

Topic#	Topic	Ref. in the Text	Lect.	CLO	Teaching Procedure
1	Sampling Theorem	Ch.6.1	2 Hrs	1	L*, T**
	<b>Assig#1 Submission &amp; Tutorial Session</b>		1 Hr		
2	PCM	Ch.6.2	4 Hrs	2	L, T
3	$\Delta$ Mod., DPCM	Ch.6.3, 6.4	3 Hrs	2	L, T
	<b>Assig#2 Submission</b>				
4	Line Coding	Ch.7.2	4 Hr	2	L, T
	<b>Assig#3 Submission &amp; Tutorial Session</b>		1 Hr		
	<b>Midterm Test#1</b>		1 Hr		
5	Digital Multiplexing	Ch.7.9	3 Hr	3	L, T
6	Baseband Transmission, ISI, Nyquist Criterion, and Pulse Shaping.	Ch.7.3	4 Hrs	5	L, T
	<b>Assig#4</b>				L, T
7	Equalizers & Bit Synchronization	Ch.7.5	2 Hrs	5	L, T
	<b>Assig#5 Submission &amp; Tutorial Session</b>		1 Hr		



8	Probability and Random Processes (Review)	Notes	0 Hr		L, T
	<b>Midterm Test#2</b>		1 Hr		
9	Detection-BER	Ch.7.6	2 Hrs	4	L, T
10	Binary Digital Carrier Sys. (BASK, BFSK, BPSK and DPSK)	Ch.7.8 & Notes	4 Hrs	6	L, T
11	Binary Optimum Receiver (Matched Filter)	Ch.13.1-13.3	4 Hrs	4,7	L, T
12	M-Ary Communication	Ch.7.7, Ch.13.5	3 Hrs	8	L, T
13	M-Ary Optimum Receiver	Ch.14.1-14.3	3 Hrs	8	L, T
	<b>Assig#6 Submission &amp; Tutorial Session</b>		1 Hr		
	<b>Final Test</b>		2 Hrs		

(\*) L: Lecturing

(\*\*) T: Tutorial.

### Textbook

“*Modern Digital and Analog Communication Systems*”, B.P. Lathi & Zhi Ding, Oxford University Press, 4rd Edition, 2009

### References:

1. “Communication Systems “, by Simon Haykin, 4<sup>th</sup> edition, John Wiley & sons Inc., 2001.
2. "Digital Communications: Fundamentals and Applications". B. Sklar, 2<sup>nd</sup> Ed., Prentice-Hall, 2001. (17<sup>th</sup> printing, 2009)
3. “Communication Systems Engineering”, Proakis and Salehi, Prentice Hall.
4. "Analog and Digital Communication Systems", by M. S. Roden, P-H, Inc, 1996.
5. . "Digital Communications", by I. Glover & P. Grant, Prentice-Hall, 1998.
6. "Introduction to Communication Systems", by F. Stremler, A. Wesley Company, Inc., 1990.

### Assessment Methods:

Methods	Grade	Date
Test 1	20	
Test 2	20	
Assignment + Quizes	10	
Final Exam	50	

