Hashemite University
College of Engineering
Department of Electrical Engineering
(EE 432)- Digital Communications (3 Credit Hours/Dept. Compulsory)

Instructor

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Grading info

Mid	(30-40)% **02/08/2020**
Project	(10-20)% **12/08/2020**
Final	(40-60)%

Class Info

Days	Sun-Wedn
Time	8:00-9:15
Location	Online

Course

Course Number:	110409432
Prerequisite:	Analog Communication (110409325); Probability and Random Processes (110409321) - knowledge of communication systems, and probability theory
Textbook:	**"Digital Communication,"** J. Proakis, 5th edition, 2007, MGraw-Hill.
Course Description:	Review of signals. Source coding techniques: Huffman coding, Shanon-Fano algorithm, Lembel-Ziv algorithm. Digital bandpass modulation: Amplitude Shift-Keying (ASK), Frequency Shift-Keying (FSK), Phase Shift-Keying (PSK), Quadrature Amplitude Modulation (QAM). Introduction to information theory, channel capacity and channel coding.
Specific Outcomes of Instruction (Course Learning Outcomes):	1. Understand the overall digital communication system and the basic signal transformation. **(e)** 2. Evaluate the spectral characterization of baseband/bandpass signaling. **(a, e)** 3. Perform and simulate data redundancy reduction through using different source coding techniques. **(e, k)** 4. Conclude optimum demodulation/detection methods for digital communications over AWGN channel. **(e)** 5. Evaluate the error rate performance for a number of modulation schemes in AWGN environments. **(a, e)** 6. Calculate the channel capacity for several channel models. **(a, e)** 7. Understand the principles of channel coding and evaluate the performance of linear block codes. **(e)**
Important material	- Lecture notes - References

References:

"Digital Communications and Applications," B. Sklar, Prentice-Hall, 2nd edition, 2001,.

Major Topics Covered and Schedule in Weeks:

Topic	# Weeks	# Contact hours
Introduction to communications systems, components, signals, spectra, …	2	6
Source coding: Huffman coding, Lembel-Ziv coding	3	9
Digital baseband and bandpass modulations: Optimum receiver design, Pulse Amplitude Modulation (PAM), Amplitude shift-Keying (ASK), Frequency shift-Keying (FSK), Phase shift-Keying (PSK), Quadrature Amplitude Modulation (QAM),…	4	12
Introduction to information theory and channel capacity	3	9
Error control coding: block coding, encoding using generator matrix, decoding using parity check matrix, syndrome decoding, minimum distance decoding	3	9
Total	**15**	**45**

Student Outcomes (SO) Addressed by the Course:

#	*Outcome Description*	*Contribution*
(a)	an ability to apply knowledge of mathematics, science, and engineering	***M***
(b)	an ability to design and conduct experiments, as well as to analyze and interpret data	
(c)	an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability	
(d)	an ability to function on multidisciplinary teams	
(e)	an ability to identify, formulate, and solve engineering problems	***H***
(f)	an understanding of professional and ethical responsibility	
(g)	an ability to communicate effectively	
(h)	the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context	
(i)	a recognition of the need for, and an ability to engage in life-long learning	
(j)	a knowledge of contemporary issues	
(k)	an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice	***L***

H=High, **M**= Medium, **L**=Low

Course Policy

- If you miss class, there won't be a makeup test, quiz, etc. and you WILL get a zero unless you have a valid excuse.
- Cheating and plagiarism are completely prohibited.
- If you miss more than 15% of classes you will automatically fail the class.