

King Fahd University of Petroleum and Minerals
College of Computer Sciences and Engineering
Department of Computer Engineering
COE 341: Data and Computer Communications (3-0-3)

Co-requisite: STAT 319 (Probability and Statistics for Engineers and Scientists).

Textbook: *Data and Computer Communication*, William Stallings, Prentice Hall International, 8th Edition, 2007.

References: *Data Communications and Networking*. Behrouz A Forouzan, McGraw-Hill Science/Engineering/ Math; 3rd edition, 2003.

Instructor: Dr. Ashraf S. Mahmoud (Room 22-148-3, Ext 1724, email: ashraf@kfupm.edu.sa)

Webpage: http://faculty.kfupm.edu.sa/COE/ashraf/RichFilesTeaching/COE082_341/coe_082_341.htm

Class Time/Place: UT 08:30-09:45 am – Building 22, Room 119.

Office Hours: UT 09:45-11:45 or by appointment.

Catalog Description:

Introduction to data communication. Overview of the OSI model. Frequency response, bandwidth, filtering, and noise. Fourier series and transform. Information theory concepts such as Nyquist theorem, Shannon theorem, and Sampling theorem. Analog and digital modulation techniques. Pulse Code Modulation (PCM). Communication systems circuits and devices. Data encoding. Physical Layer Protocols. Data Link Control (point to point communication; design issues; link management; error control; flow control). Multiplexing.

Attendance: Attendance is required by all students. Official and authorized absence excuse must be presented to the instructor no later than one week following the absence. Unexcused absences lead to a “DEN” grade (university policy).

Tentative Grading Policy:

		<i>Tentative Date</i>
• Quizzes:	10%	
• Homeworks:	10%	
• Programming Assignment	08% (<i>Matlab assignments</i>)	
• Essay/Presentation:	07%	
• Major Exam I:	15%	To be scheduled
• Major Exam II:	20%	To be scheduled
• Final Exam:	30% (<i>Comprehensive</i>)	Scheduled by Registrar
 Total	<hr/> 100%	

Course Learning Outcomes:

1. Ability to apply knowledge of mathematics to understand basic concepts in communication engineering.
2. Ability to analyze and/or design basic communication systems, processes, and components.
3. Ability to identify, formulate, analyze, and solve basic communication engineering problems.
4. Ability to use modern programming tools and skills for the simulation, analysis, and design of basic communication systems and components.
5. Ability to demonstrate self learning skills and aptitudes.

Course Topics:

- 1. Communication and Networking Models: 4 lectures** - Communication Model, Data Communications, Networking. Protocols (characteristics and functions) and Protocol Architecture (The OSI model).
- 2. Data Transmission: 6 lectures** - Concepts and terminology, Analog and Digital Data Transmission, Fourier Series Analysis and Fourier Transform Representation, Transmission Impairments, Nyquist and Shannon channel capacities.
- 3. Guided and Wireless Transmission: 2 lectures** - Guided transmission media, Wireless transmission.
- 4. Signal Encoding Techniques: 8 lectures** - Digital Data – Digital Signals, Digital Data – Analog Signals, Analog Data - Digital Signals, Analog Data – Analog Signal.
- 5. Digital Data Communication Techniques: 6 lectures** - Asynchronous and synchronous data interface, Error types, Error Detection, Flow Control and Error Control (stop-and-wait and sliding window). HDLC frames and control mechanisms.
- 6. Multiplexing: 4 lectures** - Frequency division multiplexing, Time division multiplexing (synchronous and statistical), Asymmetric digital subscriber line (ADSL).

Weekly Course Schedule

Week	Topic	Textbook Section
1 (Feb 28 th)	Communication Model, Data Communications, Networking	Chapter 1 (1.1, 1.2, 1.3, 1.4)
2 (Mar 7 th)	Protocols (characteristics and functions) and Protocol Architecture (The OSI model). Introducing the tool to be used in the programming assignment	Chapter 2 (2.1, 2.2, 2.3, 2.4)
3 (Mar 14 th)	Data Transmission (concepts and terminology), Analog and Digital Data Transmission	Chapter 3 (3.1, 3.2)
4 (Mar 21 st)	Analog and Digital Data Transmission (continued) – Fourier Series Analysis and Fourier Transform Representation	Fourier Transform Appendix B + 3.3 & 3.4
5 (Mar 28 th)	Transmission Impairments. Nyquist formula and Shannon's Capacity	Chapter 3 (3.3, 3.4, & 3.5)+ Appendix 3A
<i>Major Exam I (Tentative – to be decided in class)</i>		
6 (Apr 4 th)	Transmission Media: Guided & Wireless	Chapter 4 (4.1, 4.2, 4.3, and 4.4)
7 (Apr 11 th)	Digital Data – Digital Signals	Chapter 5 (5.1)
8 (Apr 18 th)	Digital Data – Analog Signals	Chapter 5 (5.2)
9 (May 2 nd)	Analog Data - Digital Signals	Chapter 5 (5.3)
10 (May 9 th)	Analog Data – Analog Signals	Chapter 5 (5.5)
11 (May 16 th)	Asynchronous and synchronous transmission, Types of errors, Error Detection	Chapter 6 (6.1, 6.2, 6.3)
12 (May 23 rd)	Flow Control (stop-and-wait and sliding window flow) and Error Control	Chapter 7 (7.1 & 7.2)
<i>Major Exam II (Tentative – to be decided in class)</i>		
13 (May 30 th)	Error Control (continued), HDLC	Chapter 7 (7.2 & 7.3)
14 (June 6 th)	FDM and Synchronous TDM	Chapter 8 (8.1 & 8.2)
15 (June 13 th)	Statistical TDM, ADSL	Chapter (8.3 & 8.4)
<i>Final Exam (Comprehensive – Scheduled by Registrar)</i>		