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 Stalling, Prentice Hall International, 7th Edition, 2004.
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**)
Class Time/Place: UT 10:00-11:15 am – Building 24, Room 125.
Office Hours: UT 11:30-12:50 (excluding prayer time) and 3:30-4:30 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: *Tentative* Date

• Quizzes:	**15%**	
• Homeworks:	**10%**	
• Major Exam I:	**15%**	**October 25th (class time)**
• Major Exam II:	**20%**	**December 9th (class time)**
• Final Exam:	**30%** (*Comprehensive*)	Scheduled by Registrar
• Programming Assignment	**05% (***Matlab***)**	
• Term Paper/Presentation:	**05%**	
Total*	**100%**	

*Bonus marks are awarded for perfect attendence and active participation in class activities

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 (Sept 9th)	Communication Model, Data Communications, Networking	**Chapter 1**
2 (Sept 16th)	Protocols (characteristics and functions) and Protocol Architecture (The OSI model). Introducing the tool to be used in the programming assignment	**Chapter 2**
3 (Sept 23rd)*	Data Transmission (concepts and terminology), Analog and Digital Data Transmission	**3.1, 3.2**
4 (Sept 30th)	Analog and Digital Data Transmission (continued) – Fourier Series Analysis and Fourier Transform Representation	**Fourier Transform Appendix B + 3.1 & 3.2**
5 (Oct 21st)	Transmission Impairments. Nyquist formula and Shannon's Capacity	**3.3, 3.4, & 3.5 + Appendix 3A**
Major Exam I (Tentative – to be decided in class)		
6 (Oct 28th)	Transmission Media: Guided & Wireless	**4.1, 4.2, 4.3, and 4.4**
7 (Nov 4th)	Data Encoding: Digital Data – Digital Signals	**5.1**
8 (Nov 11th)	Data Encoding: Digital Data – Analog Signals	**5.2**
9 (Nov 18th)	Data Encoding: Analog Data - Digital Signals, Analog Data – Analog Signal	**5.3 & 5.4**
10 (Nov 25th)	Data Encoding: Analog Data – Analog Signal (continued)	**5.4 & 5.5**
11 (Dec 2nd)	Asynchronous and synchronous data interface, Error Detection	**6.1, 6.2, & 6.3**
12 (Dec 9th)	Flow Control (stop-and-wait and sliding window flow) and Error Control	**7.1 & 7.2**
Major Exam II (Tentative – to be decided in class)		
13 (Dec 30th)	Error Control (continued), HDLC	**7.2 & 7.3**
14 (Jan 6th)	FDM and Synchronous TDM	**8.1 & 8.2**
15 (Jan 13th)	Statistical TDM, ADSL	**8.3 & 8.4**
Final Exam (Comprehensive – Scheduled by Registrar)		

* Sept 23rd is a National Holiday – Corresponding makeup work day will be Thursday Oct 25th.