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)

Pre-requisite: MATH 102.
Textbook: *Data and Computer Communication*, William Stalling, Prentice Hall International, 9/e, 2011.
References: *Data Communications and Networking.* Behrouz A Forouzan, McGraw-Hill Science/Engineering/ Math; 5th edition, 2013.

Instructor: Dr. Ashraf S. Mahmoud (Room 22-420, Ext 1724, email: ashraf@kfupm.edu.sa
Webpage: http://faculty.kfupm.edu.sa/coe/ashraf/RichFilesTeaching/COE112_341/coe112_341.htm
Class Time/Place: SMW 11:00-11:50 am – Building 59, Room 2002.
Office Hours: TBD 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:	**13%**		
• Homework:	**12%**		
• Programming Assignment	**08%**	**(***Matlab assignments***)**	
• Essay/Presentation:	**07%**		
• Major Exam I:	**13%**		To be scheduled
• Major Exam II:	**17%**		To be scheduled
• Final Exam:	**30%**	(*Comprehensive*)	Scheduled by Registrar
Total	**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: (lecture breakdown based on three 50 min lectures per week)

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 (based on 8th edition)
1	Communication Model, Data Communications, Networking	**Chapter 1 (1.1, 1.2, 1.3, 1.4)**
2	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	Data Transmission (concepts and terminology), Analog and Digital Data Transmission	**Chapter 3 (3.1, 3.2)**
4	Analog and Digital Data Transmission (continued) – Fourier Series Analysis and Fourier Transform Representation	**Fourier Transform Appendix B + 3.3 & 3.4**
5	Transmission Impairments. Nyquist formula and Shannon's Capacity	**Chapter 3 (3.3, 3.4, & 3.5)+ Appendix 3A**
Major Exam I (Tentative – to be decided in class)		
6	Transmission Media: Guided & Wireless	**Chapter 4 (4.1, 4.2, 4.3, and 4.4)**
7	Digital Data – Digital Signals	**Chapter 5 (5.1)**
8	Digital Data – Analog Signals	**Chapter 5 (5.2)**
9	Analog Data - Digital Signals	**Chapter 5 (5.3)**
10	Analog Data – Analog Signals	**Chapter 5 (5.5)**
11	Asynchronous and synchronous transmission, Types of errors, Error Detection	**Chapter 6 (6.1, 6.2, 6.3)**
12	Flow Control (stop-and-wait and sliding window flow) and Error Control	**Chapter 7 (7.1 & 7.2)**
Major Exam II (Tentative – to be decided in class)		
13	Error Control (continued), HDLC	**Chapter 7 (7.2 & 7.3)**
14	FDM and Synchronous TDM	**Chapter 8 (8.1 & 8.2)**
15	Statistical TDM, ADSL	**Chapter (8.3 & 8.4)**
Final Exam (Comprehensive – Scheduled by Registrar)		