



Course Specification

— (Bachelor)

Course Title: **Data Transmission**

Course Code: **CENX 341**

Program: **B.S. in Computer Engineering**

Department: **Department of Computer Engineering**

College: **College of Computer and Information Sciences**

Institution: **King Saud University**

Version: *Course Specification Version Number*

Last Revision Date: *Pick Revision Date.*

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A. General information about the course:

1. Course Identification

1. Credit hours: (3 hours)

2. Course type

A. ☐ University ☐ College ☒ Department ☐ Track ☐ Others
B. ☒ Required ☐ Elective

3. Level/year at which this course is offered: (Level 7)

4. Course general Description:

This course introduces the student to various technologies and algorithms used in the physical and the data link layer of computer networks. Specifically, it covers all aspects of point-to-point communication links such as transmission media, signal encoding, error detection, correction and data link control protocols. This provides the foundation for subsequent courses on computer networks.

5. Pre-requirements for this course (if any):

Signals and Systems Analysis, CENX 351

6. Co-requirements for this course (if any):

7. Course Main Objective(s):

This course provides students with basic knowledge of both physical and data link layers of the OSI and TCP/IP reference model.

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	4 hours per week	100%
2	E-learning		
3	Hybrid - Traditional classroom - E-learning		
4	Distance learning		

3. Contact Hours (based on the academic semester)





No	Activity	Contact Hours
1.	Lectures	45
2.	Laboratory/Studio	30
3.	Field	
4.	Tutorial	15
5.	Others (specify)	
Total		90

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	Knowledge and understanding			
1.1	Describe the layered protocol architecture of computer networks.	1	Lectures and Tutorials	Exams and Homework
1.2	Recognize data transmission principles, bandwidth, transmission impairments and channel capacity.	1	Lectures and Tutorials	Exams and Homework
1.3	Recognize various multiplexing techniques.	1	Lectures and Tutorials and Lab	Exams and Homework and Lab
2.0	Skills			
2.1	Demonstrate the characteristics of the various transmission media.	2	Lectures and Tutorials and Lab	Exams and Homework and Lab
2.2	Apply basic error detection and correction codes.	2	Lectures and Tutorials	Exams and Homework and Lab
2.3	Apply and illustrate the operation of Data Link protocols.	2	Lectures and Tutorials	Exams and Homework and Lab
3.0	Values, autonomy, and responsibility			
3.1	Experiment digital and analog signaling techniques and discuss their design principles.	6	Lectures and Tutorials and Lab	Exams and Homework and Lab



C. Course Content

No	List of Topics	Contact Hours
1.	Communication systems overview, Protocol architecture, OSI and TCP/IP reference model	4
2.	Types of data transmission, transmission impairments, Channel capacity, bandwidth efficiency	8
3.	Guided transmission media, wireless transmission (unguided media), wireless propagation	8
4.	Digital signaling: NRZ, AMI, Biphase, scrambling Techniques	4
5.	Analog signaling: ASK, FSK, PSK, QPSK, multi-level signaling	4
6.	Error detection: types of errors, 2D parity check, Internet checksum, CRC; Forward Error correction (FEC)	8
7.	Data Link control: character synchronization, bit synchronization, block synchronization (framing); Fixed-Length framing, Byte-oriented framing, Bit-oriented framing, Length-Field framing	4
8.	Flow control: concept, Stop-and-Wait flow control, Sliding window flow Control	4
9.	Error Control: Reliability concept, ARQ concept, Stop-and-Wait ARQ, Go-Back-N, Selective Repeat	4
10.	Multiplexing: FDM, WDM, TDM; Digital carrier systems: PCM, E1, SONET/SDH	4
11.	ADSL, xDSL; Duplexing Techniques: FDD, TDD	4
12.	Review and Evaluation	4
Total		60

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Midterm Examination (1)	7	15%
2.	Midterm Examination (2)	12	15%
3.	Homework Assignments	Weekly	5%
4.	LAB experiment reports	Weekly	25%
5.	Final Exam	16	40%

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1. References and Learning Resources





Essential References	Data and Computer Communications (10th Edition), William Stallings, Prentice-Hall, ISBN-10: ISBN-10: 0133506487.
Supportive References	Data Communications and Networking, Behrouz Forouzan, McGraw-Hill, 5th Edition, 2012. ISBN-10: 0073376221.
Electronic Materials	https://lms.ksu.edu.sa http://williamstallings.com/DataComm/DCC10e-Student/
Other Learning Materials	

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Lecture room with number of seats enough to accommodate enrolled students.
Technology equipment (projector, smart board, software)	Overhead projector with required software to facilitate presentations on smart board.
Other equipment (depending on the nature of the specialty)	

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Department Council	Course reports are evaluated by the Department Council.
Effectiveness of Students assessment	Faculty-Peer Review	Final examination is moderated.
Quality of learning resources	Students	Indirect – Edu-gate survey.
The extent to which CLOs have been achieved	Students	Attainment level of every CLO is measured directly.
Other		

Assessors (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify))

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	
REFERENCE NO.	
DATE	

