

**MORGANSTATEUNIVERSITY**  
**DEPARTMENT OF ELECTRICAL AND COMPUTER ENGINEERING**

**EEGR410 Introduction to Networks**

Credits: 3

**COURSE SYLLABUS**

**Instructor:**

**Office:**

**Telephone No.**

**Email Address:**

**Office Hours:**

**References**

*Data and Computer Communications 8th Edition, William Stallings, Prentice Hall, 2014*

Other reference material as provided via Bb

**Catalog Description**

An introduction to communication networks. Includes the OSI layering model of networks with emphasis on the physical, data link, and network layers; and network topologies. Introduction to a variety of computer, satellite, and local-area communication networks, including Ethernet, and Internet.

**Prerequisite:** EEGR 317

**Course Requirements**

This course is an elective course for all engineering undergraduate students, especially those with the computer engineering, networks, communications concentration, or cyber security interest. This course relates heavily to the EEGR480/481/482/483 series.

**Course Objectives**

The focus of this course is the development of the theory and the practices in digital communications as applied to data networks.

The student will be able to:

**CO1:** identify and explain the fundamental concepts of protocols and examine protocol structures.(Ch1-2)

**CO2:** examine/design a data communication link considering fundamental concepts of signals, medium, encoding, reliability and efficiency. (Ch3 – 9)

**CO3:** identify key elements of Wide Area Networks, such as switching, routing, congestion, and QoS.(Ch10-14)

**CO4:** architect a Local Area Networks considering the shared medium choices for high-speed LANs or Wireless LANs (Ch15-17)

**CO5:** understand and examine Internet and Transport Protocols and gain deep knowledge on Internetwork operations (Ch18-20)

**CO6:** identify the key aspects of internet applications such as network security, Email and network management, DNS and web servers and multimedia (Ch 21-24)

Week	Ch	Topic	Assignments
1	1-2	<p>Review of Data Communications, Networking, and Network protocols and architectures, TCP/IP, and the internet based Applications. <b>(CO1)</b></p> <p>1.1 Data Communications and Networking for Today's Enterprise</p> <p>1.2 A Communications Model</p> <p>1.3 Data Communications</p> <p>1.4 Networks</p> <p>1.5 The Internet</p> <p>1.6 An Example Configuration</p> <p>2.1 The Need for a Protocol Architecture</p> <p>2.2 The TCP/IP Protocol Architecture</p> <p>2.3 The OSI Model</p> <p>2.4 Standardization within a Protocol Architecture</p> <p>2.5 Traditional Internet-Based Applications</p> <p>2.6 Multimedia</p>	HW1, Quiz 1
2	3-4	<p>Data Transmission, Channel Capacity, Wire, wireless and fiber (Project 1) <b>(CO2)</b></p> <p>3.1 Concepts and Terminology</p> <p>3.2 Analog and Digital Data Transmission</p> <p>3.3 Transmission Impairments</p> <p>3.4 Channel Capacity</p> <p>4.1 Guided Transmission Media</p> <p>4.2 Wireless Transmission</p> <p>4.3 Wireless Propagation, Transport Layer Security</p> <p>4.4 Line-of-Sight Transmission</p>	HW2, Project 1
3	5-6	<p>Data encoding/Modulation, Error Control, EIA232 Interfaces<b>(CO2)</b></p> <p>5.1 Digital Data, Digital Signals</p> <p>5.2 Digital Data, Analog Signals</p> <p>5.3 Analog Data, Digital Signals</p> <p>5.4 Analog Data, Analog Signals</p> <p>6.1 Asynchronous and Synchronous Transmission</p>	HW 3, Quiz 2

		<p>6.2 Types of Errors</p> <p>6.3 Error Detection</p> <p>6.4 Error Correction</p> <p>6.5 Line Configurations</p>	
4	7	<p>Flow Control, Error Control, Performance App <b>(CO2)</b></p> <p>7.1 Flow Control</p> <p>7.2 Error Control</p> <p>7.3 High-Level Data Link Control (HDLC)</p>	HW 4
5	8	<p>Multiplexing, ( Project 2) <b>(CO2)</b></p> <p>8.1 Frequency-Division Multiplexing</p> <p>8.2 Synchronous Time-Division Multiplexing</p> <p>8.3 Statistical Time-Division Multiplexing</p> <p>8.4 Asymmetric Digital Subscriber Line</p> <p>8.5 xDSL</p>	HW 5, Project 2
6	9, 10	<p>Spread Spectrum and Circuit and packet switching/ATM<b>(CO2,3)</b></p> <p>9.1 The Concept of Spread Spectrum</p> <p>9.2 Frequency Hopping Spread Spectrum</p> <p>9.3 Direct Sequence Spread Spectrum</p> <p>9.4 Code-Division Multiple Access</p> <p>10.1 Switched Communications Networks</p> <p>10.2 Circuit Switching Networks</p> <p>10.3 Circuit Switching Concepts</p> <p>10.4 Softswitch Architecture</p> <p>10.5 Packet-Switching Principles</p> <p>10.6 X.25 317</p> <p>10.7 Frame Relay 319</p>	HW6, Quiz 3
7	12,13	<p>Congestion in Data Networks /Routing<b>(CO3)</b></p> <p>12.1 Routing in Packet-Switching Networks</p> <p>12.2 Examples: Routing in ARPANET</p> <p>12.3 Least-Cost Algorithms</p> <p>13.1 Effects of Congestion</p> <p>13.2 Congestion Control</p> <p>13.3 Traffic Management</p> <p>13.4 Congestion Control in Packet-Switching Networks</p>	HW7

		13.5 Frame Relay Congestion Control 13.6 ATM Traffic Management 13.7 ATM-GFR Traffic Management	
8		EXAM	EXAM
9	15	LANs (Project 3) ( <b>CO4</b> ) 15.1 Background 15.2 Topologies and Transmission Media 15.3 LAN Protocol Architecture 15.4 Bridges 15.5 Layer 2 and Layer 3 Switches	HW 8, Project 3
10	16	High Speed LAN( <b>CO4</b> ) 16.1 The Emergence of High-Speed LANs 16.2 Ethernet 16.3 Fiber Channel	HW9, Quiz 4
11	17	Wireless LANs ( <b>CO4</b> ) 17.1 Overview 17.2 Wireless LAN Technology 17.3 IEEE 802.11 Architecture and Services 17.4 IEEE 802.11 Medium Access Control 17.5 IEEE 802.11 Physical Layer 17.6 IEEE 802.11 Security Considerations	HW 10
12	18	Internet Architecture – TCP/IP Project 4( <b>CO5</b> ) 18.1 Basic Protocol Functions 18.2 Principles of Internetworking 18.3 Internet Protocol Operation 18.4 Internet Protocol 18.5 IPv6 18.6 Virtual Private Networks and IP Security	HW 11, Project 4(Final Project)
13	19	Integrated Services Architecture ( <b>CO5</b> ) 19.1 Multicasting 19.2 Routing Protocols 19.3 Integrated Services Architecture 19.4 Differentiated Services 19.5 Service Level Agreements 19.6 IP Performance Metrics	HW 12, Quiz 5

14	20, 22	<p>Transport Control Protocols, Email and Applications(<b>CO5,6</b>)</p> <p>20.1 Connection-Oriented Transport Protocol Mechanisms</p> <p>20.2 TCP</p> <p>20.3 TCP Congestion Control</p> <p>20.4 UDP</p> <p>22.1 Electronic Mail: SMTP and MIME</p> <p>22.2 Network Management: SNMP</p> <p>22.3 Recommended Reading and Web Sites</p> <p>22.4 Key Terms, Review Questions, and Problems</p>	HW 13, Presentations
15	21,23,24	<p>Network Security and Internet Applications (Final Project) (<b>CO6</b>)</p> <p>21.1 Security Requirements and Attacks</p> <p>21.2 Confidentiality with Conventional Encryption</p> <p>21.3 Message Authentication and Hash Functions</p> <p>21.4 Public-Key Encryption and Digital Signatures</p> <p>21.5 Secure Socket Layer and Transport Layer Security</p> <p>21.6 IPv4 and IPv6 Security</p> <p>21.7 Wi-Fi Protected Access</p> <p>23.1 Internet Directory Service: DNS</p> <p>23.2 Web Access: HTTP</p> <p>24.1 Audio and Video Compression</p> <p>24.2 Real-Time Traffic</p> <p>24.3 Voice Over IP and Multimedia Support—SIP</p> <p>24.4 Real-Time Transport Protocol (RTP)</p>	

**Format**

ONLINE

**Grading**

Homework	10 %
Projects	20 %
Quizzes	25 %
Mid-term Examination	25 %

Final Project (Theoretical & Written Component, plus Oral Presentation) 20 %

**NOTE: Any material submitted that is substantially copied from other students without citation or from the Internet will receive a zero grade.**

**Notes: Expectations and Requirements**

1. Students are expected to log on to Bb 3 times a week.
2. Students are expected to be actively engaged on the discussion board conversations.
3. Homework and other assignments are due by midnight of the given due date. Late penalty will be deducted for late submission.
4. A programming assignment might be given in lieu of a quiz.
5. Academic misconduct or cheating during an exam will result in an F grade for the course.