MORGANSTATEUNIVERSITY
DEPARTMENT OF ELECTRICAL AND COMPUTER ENGINEERING

EEGR410 Introduction to Networks

Credits: 3

COURSE SYLLABUS

Instructor:
Office:
Telephone No.
Email Address:
Office Hours:

References

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 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)
<table>
<thead>
<tr>
<th>Week</th>
<th>Ch</th>
<th>Topic</th>
<th>Assignments</th>
</tr>
</thead>
</table>
| 1    | 1-2| Review of Data Communications, Networking, and Network protocols and architectures, TCP/IP, and the internet based Applications. (CO1)  
1.1 Data Communications and Networking for Today’s Enterprise  
1.2 A Communications Model  
1.3 Data Communications  
1.4 Networks  
1.5 The Internet  
1.6 An Example Configuration  
2.1 The Need for a Protocol Architecture  
2.2 The TCP/IP Protocol Architecture  
2.3 The OSI Model  
2.4 Standardization within a Protocol Architecture  
2.5 Traditional Internet-Based Applications  
2.6 Multimedia | HW1, Quiz 1 |
| 2    | 3-4| Data Transmission, Channel Capacity, Wire, wireless and fiber (Project 1) (CO2)  
3.1 Concepts and Terminology  
3.2 Analog and Digital Data Transmission  
3.3 Transmission Impairments  
3.4 Channel Capacity  
4.1 Guided Transmission Media  
4.2 Wireless Transmission  
4.3 Wireless Propagation, Transport Layer Security  
4.4 Line-of-Sight Transmission | HW2, Project 1 |
| 3    | 5-6| Data encoding/Modulation, Error Control, EIA232 Interfaces (CO2)  
5.1 Digital Data, Digital Signals  
5.2 Digital Data, Analog Signals  
5.3 Analog Data, Digital Signals  
5.4 Analog Data, Analog Signals  
6.1 Asynchronous and Synchronous Transmission | HW 3, Quiz 2 |
<table>
<thead>
<tr>
<th>Page</th>
<th>Sections</th>
<th>Exercises</th>
<th>Notes</th>
</tr>
</thead>
</table>
| 4    | 6.2 Types of Errors  
6.3 Error Detection  
6.4 Error Correction  
6.5 Line Configurations | Flow Control, Error Control, Performance App (CO2)  
7.1 Flow Control  
7.2 Error Control  
7.3 High-Level Data Link Control (HDLC) | HW 4 |
| 5    | 7        | Multiplexing, (Project 2) (CO2)  
8.1 Frequency-Division Multiplexing  
8.2 Synchronous Time-Division Multiplexing  
8.3 Statistical Time-Division Multiplexing  
8.4 Asymmetric Digital Subscriber Line  
8.5 xDSL | HW 5, Project 2 |
| 6    | 9, 10    | Spread Spectrum and Circuit and packet switching(ATM(CO2,3))  
9.1 The Concept of Spread Spectrum  
9.2 Frequency Hopping Spread Spectrum  
9.3 Direct Sequence Spread Spectrum  
9.4 Code-Division Multiple Access  
10.1 Switched Communications Networks  
10.2 Circuit Switching Networks  
10.3 Circuit Switching Concepts  
10.4 Softswitch Architecture  
10.5 Packet-Switching Principles  
10.6 X.25 317  
10.7 Frame Relay 319 | HW6, Quiz 3 |
| 7    | 12,13    | Congestion in Data Networks /Routing(CO3)  
12.1 Routing in Packet-Switching Networks  
12.2 Examples: Routing in ARPANET  
12.3 Least-Cost Algorithms  
13.1 Effects of Congestion  
13.2 Congestion Control  
13.3 Traffic Management  
13.4 Congestion Control in Packet-Switching Networks | HW7 |
<table>
<thead>
<tr>
<th>Chapter</th>
<th>Section</th>
<th>Content</th>
</tr>
</thead>
<tbody>
<tr>
<td>13</td>
<td>5</td>
<td>Frame Relay Congestion Control</td>
</tr>
<tr>
<td>13</td>
<td>6</td>
<td>ATM Traffic Management</td>
</tr>
<tr>
<td>13</td>
<td>7</td>
<td>ATM-GFR Traffic Management</td>
</tr>
<tr>
<td>8</td>
<td></td>
<td>EXAM</td>
</tr>
<tr>
<td>9</td>
<td>15</td>
<td>LANs (Project 3) <em>(CO4)</em></td>
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<tr>
<td></td>
<td></td>
<td>15.1 Background</td>
</tr>
<tr>
<td></td>
<td></td>
<td>15.2 Topologies and Transmission Media</td>
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<tr>
<td></td>
<td></td>
<td>15.3 LAN Protocol Architecture</td>
</tr>
<tr>
<td></td>
<td></td>
<td>15.4 Bridges</td>
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<tr>
<td></td>
<td></td>
<td>15.5 Layer 2 and Layer 3 Switches</td>
</tr>
<tr>
<td>10</td>
<td>16</td>
<td>High Speed LAN*(CO4)*</td>
</tr>
<tr>
<td></td>
<td></td>
<td>16.1 The Emergence of High-Speed LANs</td>
</tr>
<tr>
<td></td>
<td></td>
<td>16.2 Ethernet</td>
</tr>
<tr>
<td></td>
<td></td>
<td>16.3 Fiber Channel</td>
</tr>
<tr>
<td>11</td>
<td>17</td>
<td>Wireless LANs <em>(CO4)</em></td>
</tr>
<tr>
<td></td>
<td></td>
<td>17.1 Overview</td>
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<tr>
<td></td>
<td></td>
<td>17.2 Wireless LAN Technology</td>
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<tr>
<td></td>
<td></td>
<td>17.3 IEEE 802.11 Architecture and Services</td>
</tr>
<tr>
<td></td>
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<td>17.4 IEEE 802.11 Medium Access Control</td>
</tr>
<tr>
<td></td>
<td></td>
<td>17.5 IEEE 802.11 Physical Layer</td>
</tr>
<tr>
<td></td>
<td></td>
<td>17.6 IEEE 802.11 Security Considerations</td>
</tr>
<tr>
<td>12</td>
<td>18</td>
<td>Internet Architecture – TCP/IP Project 4*(CO5)*</td>
</tr>
<tr>
<td></td>
<td></td>
<td>18.1 Basic Protocol Functions</td>
</tr>
<tr>
<td></td>
<td></td>
<td>18.2 Principles of Internetworking</td>
</tr>
<tr>
<td></td>
<td></td>
<td>18.3 Internet Protocol Operation</td>
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<tr>
<td></td>
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<td>18.4 Internet Protocol</td>
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<tr>
<td></td>
<td></td>
<td>18.5 IPv6</td>
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<tr>
<td></td>
<td></td>
<td>18.6 Virtual Private Networks and IP Security</td>
</tr>
<tr>
<td>13</td>
<td>19</td>
<td>Integrated Services Architecture <em>(CO5)</em></td>
</tr>
<tr>
<td></td>
<td></td>
<td>19.1 Multicasting</td>
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<tr>
<td></td>
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<td>19.2 Routing Protocols</td>
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<tr>
<td></td>
<td></td>
<td>19.3 Integrated Services Architecture</td>
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<tr>
<td></td>
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<td>19.4 Differentiated Services</td>
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<tr>
<td></td>
<td></td>
<td>19.5 Service Level Agreements</td>
</tr>
<tr>
<td></td>
<td></td>
<td>19.6 IP Performance Metrics</td>
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<tr>
<td></td>
<td></td>
<td>HW 8, Project 3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>HW 9, Quiz 4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>HW 10</td>
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<tr>
<td></td>
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<td>HW 11, Project 4(Final Project)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>HW 12, Quiz 5</td>
</tr>
</tbody>
</table>
| 14 | 20, 22 | Transport Control Protocols, Email and Applications *(CO5,6)*  
20.1 Connection-Oriented Transport Protocol Mechanisms  
20.2 TCP  
20.3 TCP Congestion Control  
20.4 UDP  
22.1 Electronic Mail: SMTP and MIME  
22.2 Network Management: SNMP  
22.3 Recommended Reading and Web Sites  
22.4 Key Terms, Review Questions, and Problems | HW 13, Presentations |
|---|---|---|
| 15 | 21, 23, 24 | Network Security and Internet Applications (Final Project) *(CO6)*  
21.1 Security Requirements and Attacks  
21.2 Confidentiality with Conventional Encryption  
21.3 Message Authentication and Hash Functions  
21.4 Public-Key Encryption and Digital Signatures  
21.5 Secure Socket Layer and Transport Layer Security  
21.6 IPv4 and IPv6 Security  
21.7 Wi-Fi Protected Access  
23.1 Internet Directory Service: DNS  
23.2 Web Access: HTTP  
24.1 Audio and Video Compression  
24.2 Real-Time Traffic  
24.3 Voice Over IP and Multimedia Support—SIP  
24.4 Real-Time Transport Protocol (RTP) | |

**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.