Instructor Information

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Office Hours: As posted outside office door
Class: 1:00 PM - 2:15 PM (T R)
Lab: 2:30 PM - 5:20 PM (T R)
Fax: (678) 915-7285
Room: Q 310
Room: Q 334

Course Information

Course Description
This course is a survey of data communication topics. The OSI and TCP/IP protocol models are covered, with emphasis placed on protocols associated with the lower layers. The course includes synchronous and asynchronous transmission, line codes, modems, signaling, effects of bandwidth and noise, and digital and analog modulation techniques. Transmission media and error detection and correction are also covered. Other areas studied include analog-to-digital conversion, multiplexing, circuit and packet switching, and network topologies.

Prerequisites: ECET 2310, PHYS 1112K
Required or Elective: Required

Course Objectives:
Upon successful completion of this course, you should be able to perform the following tasks:
1. State the five components of a data communications system.
2. Describe the characteristics (possibly with a drawing) of mesh, star, bus, ring and hybrid topologies.
3. Name and describe the function of each layer of the OSI model.
4. Map the layers in the TCP/IP protocol suite to the layers in the OSI model.
5. Describe how the TCP/IP protocol suite utilizes physical, logical and port addresses to send and receive data.
6. Distinguish between analog and digital data/signals.
7. Derive a frequency domain representation of a sinusoidal signal given its time domain representation and vice versa.
8. Calculate the signal power and attenuation/amplification of a signal at any point in a signal path using decibel measures.
9. Use Shannon capacity and Nyquist bit rate equations to determine the data rate limit and number of signal levels required to transmit a digital signal across a channel.
10. Distinguish between a data element and a signal element.
11. Utilize the rules of a line encoding scheme to convert a stream of bits into a digital signal and vice versa.
12. Utilize the rules of a block encoding scheme to convert a stream of bits into a digital signal and vice versa.
13. Utilize scrambling rules to replace a long sequence of zeros.
14. Describe the three processes involved in pulse code modulation (PCM).
15. Compute the bandwidth, signal rate or data rate of a digital-to-analog conversion scheme if provided with the other parameters.
16. Draw the constellation diagram of a digital-to-analog conversion (modulation) scheme given the parameters of the scheme and vice versa.
17. Describe the function of FDM, WDM and TDM schemes.
18. Describe the function of FHSS and DSSS schemes.
19. Determine the parameters of a TDM scheme (e.g. transmission rate, frame rate, bit duration, time slot duration, and frame duration) given the appropriate information.
20. Describe the physical characteristics of twisted pair cable, coaxial cable, and fiber-optic cable.
21. Distinguish between radio wave, microwave and infrared forms of wireless transmission.
23. Calculate the total delay associated with sending a message through a circuit-switched network.
24. Describe the three major components of a telephone network.
25. State the primary purpose of signaling in a telephone network.
26. Explain how DSL technology offers much higher data rates than dial-up modems using the same twisted-pair local loop medium.
27. Explain how redundancy is utilized for error detection and correction.
28. Use modulo-2 arithmetic to calculate Hamming distances and perform parity calculations.
29. Use binary and polynomial division to perform CRC code generation and checking.
30. Use one’s complement arithmetic to calculate a checksum.
31. Describe the services provided by the data link layer.
32. Calculate the delay associated with sending a message via the Stop-and-Wait ARQ protocol, a Go-Back-N ARQ protocol, and the Selective-Repeat ARQ protocol.
33. Describe the operation of random access protocols (ALOHA, CSMA, CSMA/CD and CSMA/CA).
34. Calculate the throughput for pure ALOHA and slotted ALOHA systems.
35. Describe the operation of controlled access protocols (reservation, polling and token-passing).
36. Describe the operation of channelization protocols (FDMA, TDMA and CDMA).
37. Describe the features of the different types of Ethernet standards (Standard Ethernet, Fast Ethernet, Gigabit Ethernet).
38. Write an Ethernet address in hexadecimal or binary notation.
39. Describe the features of the IEEE 802.11 standard and the Bluetooth protocol.
40. Describe the characteristics of the 5 categories of connecting devices: passive hub, repeater, bridge, router and gateway.
41. Create a spanning tree for a bridge connected system.
42. Describe the basic structure of a cellular system.
43. Describe the band allocation and transmission schemes for D-AMPS, GSM and IS-95.
44. Use Kepler’s law to calculate the altitude and period of the orbit of a satellite.
45. Describe the function of a global positioning system (GPS).
46. Determine the relative rate relationship between signals of the SONET/SDH hierarchy.
47. Define the function of a STS Multiplexer, STS demultiplexer, regenerator, add/drop multiplexer, and a terminal.
48. Describe the function of the path layer, line layer, section layer, and photonic layer of the SONET standard.
49. Describe the structure of an STS-frame.
50. Describe how SONET uses pointers to accomplish offsetting and justification.
51. Define the term virtual tributary

Grading

Grading Policy

Grading Scale

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<th>Numerical</th>
<th>Letter</th>
<th>Grade Composition</th>
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<tr>
<td>90 – 100</td>
<td>A</td>
<td>20% - Quizzes</td>
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<tr>
<td>80 – 89</td>
<td>B</td>
<td>30% - Tests</td>
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<tr>
<td>70 – 79</td>
<td>C</td>
<td>20% - Final Exam</td>
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<td>60 – 69</td>
<td>D</td>
<td>20% - Labs</td>
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<td>0 – 59</td>
<td>F</td>
<td>10% - Group Assignments</td>
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</table>

Course Expectations/Policies

Homework

- Homework is assigned to provide students with the opportunity to review and apply new concepts taught during class on their own.
- Homework assignments will be given on a per chapter basis, but will not be graded.
- It is recommended that the homework assignments be completed, because quiz questions will be closely correlated to the assignment questions.

Group Assignments

- The purpose of a group assignment is to give each student a more thorough understanding of salient concepts taught in a chapter, that is, the chapter objectives.
- Group assignments will also help to prepare students for the demands of a real work environment, in which projects are completed by a team of professionals.
- Group members will be assigned on a random basis by the professor and will remain intact for the entire semester.
- Group assignments will be given at the completion of each chapter and will last for 30 minutes.

Quizzes

- The purpose of the quizzes is to assess a student’s comprehension of and ability to apply the concepts reviewed in given chapters.
- Quizzes will be held every two chapters, during a class period that follows the corresponding second group assignment.
- The duration for a quiz will be 30 minutes.

Tests and Final

- The purpose of the tests and final exam is to provide a more comprehensive assessment of a student’s knowledge of and ability to apply the concepts covered in class.
- 2 tests of 60 minutes duration will be given during the semester.
- A test will typically cover the content of 6 chapters.
- The final exam is comprehensive and is 120 minutes in duration.

Appealing a Grade

- You may appeal any grade received.
- All appeals for re-evaluation of a grade must be made within one week of the assessment being returned to you.
- The instructor reserves the right to re-grade the entire exam, test, quiz, lab or group assignment.

Attendance

- Attendance must be regular and punctual.
- No make-up tests/quizzes will be given, unless a credible excuse is given prior to your absence, or in the case of an emergency, on the day of your return to class.

Classroom Behavior
- Students are expected to be attentive during class, that is, there should be no sleeping, no texting, and no sustained, casual conversations.
- Students are expected to take an active part in classroom activities.

**University Policies**

**Academic Honesty**
- You are responsible for being academically honest as defined by the academic dishonesty rules in the general catalog.
- Cheating will not be tolerated.
- Any evidence of copied exams, tests, quizzes, laboratory reports, or group assignments will result in all parties involved receiving an ‘F’ or ‘0’ grade for that exam/test/quiz/lab report/group assignment.

**Accommodations for Students with Disabilities**
Students with disabilities who believe that they may need accommodations in this class are encouraged to contact the counselor working with disabilities at (678) 915-7244 as soon as possible to ensure that such accommodations are implemented in a timely fashion.
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<thead>
<tr>
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<td>01/24</td>
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Laboratory Grading

- All labs are equally weighted.
- All pre-lab requirements must be completed prior to attending the lab in order to receive full marks for the pre-lab portion of the lab. There will be a 30% deduction from the pre-lab portion of your grade for any incomplete pre-lab assignment.
- Unless otherwise specified, laboratory reports will be due by the beginning of the following laboratory period.
- Lab reports that are not handed in during the following lab period will receive a 30% deduction.
- Lab reports that are more than a week late will not be accepted.
- You must pass the lab portion in order to pass the course.

Laboratory Expectations/Policies

Attendance

- Attendance is mandatory and punctual.
- No make-up labs will be given, unless a credible excuse is given prior to your absence, or in the case of an emergency, on the day of your return to class.