M&IS 44042-001
NETWORK THEORY & APPLICATIONS
FALL 2013
TR 5:30-6:45 pm
Room 210 BSA

INSTRUCTOR: Dr. Catherine M. Bakes
OFFICE: A-405 BSA
OFFICE HOURS: Mon 2:15-4:45 pm, Wed 1:15-3:45 pm, and by appointment
OFFICE PHONE: (330) 672-1162
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TEXT: **Data Communications and Computer Networks: A Business User's Approach,** Seventh Edition, Curt M. White, Course Technology Cengage Learning, 2013, http://www.cengagebrain.com/shop/isbn/9781133626466

COURSE DESCRIPTION

This course provides an introduction to the basic concepts underlying local and wide area networks and their applications. It includes an overview of data communications protocols, transmission media, wireless technologies, and network hardware, topologies, architectures, and standards. Modulation, error control, multiplexing, and switching techniques are also discussed. In addition, students are to complete a team project focusing on some topic from the field of networking.

LEARNING OUTCOMES

By the end of this course students should:

- Understand network concepts, technology, applications, and terminology.
- Have the knowledge to participate in, and contribute to, discussions about networks with co-workers, consultants, and vendors.
- Have the ability to evaluate existing network technologies.
- Have the skills needed to analyze future network technologies and assess their usefulness in meeting current and future business needs.
- Have an awareness of the implications of network standards and regulations.
- Have the communication skills needed to write clearly and give effective presentations.
- Have strong analytical and problem solving skills.
- Have the ability to work effectively in project teams, as a team member and leader.

GRADING POLICY

6 class exercises @ 1 pt each	6 points
Course survey	1 point
5 batches of computer based training exercises	5 points
6 homework assignments @ 1 pt each	6 points
6 quizzes @ 10 pts each	60 points
Network tools exercise	6 points
Project proposal	2 points
Project presentation (including PPT file)	6 points
Project presentation forms	4 points
2 guest lecture forms @ 2 pts each	4 points
Total	100 points

On their respective due dates, **course assignments requiring hard copy submission are to be turned in during class and those requiring electronic submission are to be submitted before 7 pm. Unless you have a legitimate excuse with supporting documentation and obtain my permission prior to the due date (or, if that's impossible, at the first opportunity after the due date), you will receive a zero for a missed or late assignment.**

If you have questions concerning a grade you receive on any course assignment, it is your responsibility to inform me within 1 week of the graded assignment being returned. **Grades will not be discussed after that time. Also, to protect your privacy, any issues related to your performance in the course will only be discussed in my office or via e-mail.**

After rounding your numeric score to the nearest integer, your course letter grade will be assigned according to the scale: A = 93-100; A- = 90-92; B+ = 87-89; B = 83-86; B- = 80-82; C+ = 77-79; C = 73-76; C- = 70-72; D+ = 67-69; D = 60-66; and F = 0-59.

COURSE SCHEDULE

Week	Module	Tuesday		Wednesday		Thursday	
1	**1**	**8/27**		**8/28**		**8/29**	
2	**1**	**9/3**		**9/4**		**9/5**	
3	**2**	**9/10**		**9/11**	CBT-A & HW#1 Due	**9/12**	
4	**2**	**9/17**		**9/18**	Quiz 1 Due	**9/19**	Project Topic Due
5	**3**	**9/24**		**9/25**	HW#2 Due	**9/26**	
6	**3**	**10/1**		**10/2**	Quiz 2 Due	**10/3**	
7	**3**	**10/8**		**10/9**	Survey Due	**10/10**	
8	**4**	**10/15**	Project Proposal Due	**10/16**	CBT-B & HW#3 Due	**10/17**	
9	**4**	**10/22**		**10/23**	Quiz 3 Due	**10/24**	
10	**5**	**10/29**		**10/30**	CBT-C & HW#4 Due	**10/31**	
11	**5**	**11/5**		**11/6**	Quiz 4 Due	**11/7**	
12	**6**	**11/12**	Network Tools Due	**11/13**	CBT-D & HW#5 Due	**11/14**	**Guest Lecture #1**[+]
13	**6**	**11/19**	**GL #1 Form Due**[+]	**11/20**	Quiz 5 Due	**11/21**	**Guest Lecture #2**[+]
14		**11/26**	Project Day (no class)	**11/27**		**11/28**	Thanksgiving
15	**6**	**12/3**	**GL #2 Form Due**[+] PPT File Due	**12/4**	CBT-E & HW#6 Due	**12/5**	Project Presentations 12/5 Pres Forms Due
16		**12/10 5:45-8 pm**	Peer Form Due Project Presentations 12/10 Pres Forms Due	**12/11**	Quiz 6 Due	**12/12**	

[+] The **guest lecture (GL) dates and GL form due dates** are subject to change and will be announced in class once they have been confirmed.

COURSE WEB SITE

Access to the course website is through Blackboard, the University's course management system. To log on, go to http://learn.kent.edu and enter your username and password.

CLASS EXERCISES

There will be 6 unannounced class exercises during the semester. Each will be distributed at the start of a class period and due at the end.

COURSE SURVEY

There will be 1 course survey during the semester. It will be available on Blackboard starting at 7 pm on the Thursday before its due date.

COMPUTER-BASED TRAINING EXERCISES

The textbook author has posted 11 sets of interactive computer-based training (CBT) exercises in a zipped folder at http://facweb.cs.depaul.edu/cwhite/cbts.htm. At appropriate times throughout the semester you are to complete 10 sets of these exercises, in a series of 5 batches totaling 48 questions:

Course Module	CBT Batch	CBT Module	No. of Questions	Topic
1	A	1	6	***Packet Encapsulation****
3	B	4 9 10	4 5 5	Statistical and Synchronous TDM Datagram Networks Virtual Circuit Networks
4	C	2 5	5 4	dB Loss and Gain Sliding Window ARQ Error Control
5	D	6 7 8	5 5 5	CSMA/CD Packet Transmission Bridges and Bridge Tables Switches
6	E	11	4	Domain Name System Resolution

To install the CBTs on your own computer (which only needs to be done once), download the zipped folder and open it. After the installation is complete, you can access the CBTs anytime you wish by running the **Animate.exe** program. **To complete each CBT assignment, run the appropriate module(s) on your computer, note the answers to the questions, and then go to Blackboard to submit them. Each assignment may be submitted after 7 pm on the Thursday before its due date.**

You will be allowed 3 attempts to submit the assignment on Blackboard, and your best attempt will count towards your course grade. Each correctly answered question will be worth 0.1 points and, if you answer all 48 questions correctly, you will receive a bonus of 0.2 points.

For the Packet Encapsulation Module, you only need to record the layers being added to the transmitted packet, not the layers being removed from the packet.

HOMEWORK ASSIGNMENTS

Each homework assignment will cover material from the corresponding course module and become available on Blackboard at 7 pm on the Thursday before it is due. **You will be allowed 3 attempts, and your best attempt will count towards your course grade.**

QUIZZES

Each quiz will cover the corresponding course module (emphasizing class material) and be available on Blackboard starting at 7 pm on the Friday before its due date. **You will be allowed 1 attempt to submit it.**

NETWORK TOOLS EXERCISE

A network tools exercise will be assigned during the semester, for which **a stapled hard copy** is to be submitted at the start of class on the due date.

TEAM PROJECT

Each team of 3 or 4 students is to complete a project on a network related topic and present it in class. I will assign you to a team, and then the team will have the option of selecting its topic (which must be relevant to the course and add new information beyond the material I cover) or having me assign one for you. If you choose the former option, you must obtain my approval by the project topic due date. You may do this during office hours or by e-mail. **If you do not obtain my approval by the due date, I will assign a topic for you.**

For ideas on possible project topics, I suggest that you browse through the text, explore the Internet, and/or consult the following list:

Cloud computing
Data, audio, and video compression
Directory services and protocols
Domain name system
Fiber optic networks (PONs, SONET, WDM)
Internet of Things
IPv6
Messaging and collaboration tools
Multiprotocol label switching
Near field communications
Network security
Radio-frequency identification
Routing algorithms and protocols
Telecom regulation and deregulation (telecom legislation, net neutrality)
Unified communications
Video communications (IPTV, videoconferencing)
Virtualization
Voice over IP
Wireless communications (WLANs, Bluetooth, WiMax, cellular, wireless sensor networks)

Note that your team's topic does not have to be on this list, nor is it guaranteed that I will approve a topic that is on the list.

PROJECT PROPOSAL

Each team is to prepare a project proposal and submit **a stapled hard copy**. Make sure to include (1) the project title, (2) your team number, (3) all the team members' names, and (4) the date.

The proposal should be in the form of **a bulleted outline that is at least 1 page long (excluding the project title, etc.)** and provide details of the material that is likely to be addressed in your project. **Use size 12 Times New Roman font and 1.5 line spacing.** All members of the same team will receive the same project proposal grade.

PROJECT PRESENTATION

Each team (including every member) is to present their project in class at the end of the semester. The presentation should give a clear, complete, and concise summary of the project and have a section for each of the following:

(1) Background and overview (i.e., what it is, what it does, and how)
(2) Types and options
(3) Strengths and limitations versus alternatives
(4) Business applications
(5) Future trends and conclusion

Use PowerPoint to develop your presentation and **submit the <u>final version</u> of your PPT file (i.e., you will not be permitted to make changes to the file after submitting it) using either e-mail or the File Exchange function available on Blackboard. Name the file "44042 Team x Topic" where "x" is your team number and "Topic" is the title of your project, e.g., "*44042 Team 3 Network Security*."**

When giving your presentation, you are strongly encouraged to (1) **not read the information you present**, (2) begin the presentation by introducing your team and topic and providing an outline of the subtopics to be addressed, (3) include illustrative figures and tables (and a hands-on demonstration if appropriate), (4) conclude the presentation with a summary of the key findings, and (5) rehearse your presentation to ensure that it fits the allotted time (this will be based on the class size and announced in class approx. 2 weeks before the presentations begin). You may assume that a computer and projector will be provided, although I strongly recommend that you **have a backup plan in case of equipment failures.**

PROJECT PRESENTATION FORMS

You are required to attend all the project presentations and to submit a project presentation form (available on Blackboard) for every presentation except your own! **Print each form before that day's presentations, bring it to class, complete it during class (make sure to write legibly and to follow all the instructions provided), and submit it before you leave.**

PEER EVALUATION FORM

All team members are expected to contribute equally to completing a high-quality, integrated, professional project. Each team will be self-managed and responsible for determining the roles played by its members, and the nature of the contributions may differ across team members. It is up to the team to make these decisions appropriately, and all team members should ensure that their contributions are on track and sufficient.

Project grades will be assigned initially based on how well you satisfy the requirements outlined above. However, I reserve the right to make adjustments to individual grades based on information you are to provide on a peer evaluation form. You are to use this form (available on Blackboard) to award points that indicate the value of the contributions of each member of your team (**including yourself**) and to provide written comments justifying the points you award. Carefully follow all the instructions provided on the form and submit a hard copy. **Failure to complete and submit a peer evaluation form by the deadline is likely to result in a negative adjustment to your own project grade.**

GUEST LECTURES

You are required to attend both guest lectures (GL) and complete a GL form for each one. **Download the form from Blackboard, carefully follow all the instructions provided, and submit a hard copy at the start of class on the due date.**

MISA

The Management Information Systems Association (MISA) is the student organization for CIS majors or any other students interested in the role of information systems in today's business environment. Representatives from area businesses, recent IT retirees, and local technology "experts" give presentations at MISA meetings. MISA also hosts networking socials with experienced professionals as well as tours of local corporate data centers. MISA members enjoy preferred scholarships, certification exam reimbursements, networking opportunities, guidance in CIS classes, and a great way to land an internship or job. To learn more visit http://misa.bsa.kent.edu.

ATTENDANCE AND CLASSROOM BEHAVIOR

Attendance is not mandatory but is highly recommended if you wish to do well in the course. **You are responsible for all material presented in class and should not expect any special consideration if you miss material due to being absent.**

You are expected to be respectful of our guest speakers, other students, and the instructor at all times during the semester. It is not fair to others to cause a disruption by the noise and disturbance of a late arrival or early departure. Therefore, unless you have a legitimate reason for doing so, **do not come to class late or leave early. Also, if you must leave the classroom temporarily, please do so quietly.**

Any time you have questions please ask them, in class (raise your hand and, if someone else is speaking, wait until they have finished), during office hours, or via e-mail. This is likely to benefit other students as well as yourself. Also, **any time you have relevant comments, please share them**.

Use of cell phones is not permitted during class. They must be turned off before class begins, **stored somewhere they are not in view**, and not taken out or turned back on until after class has ended.

Improper classroom behavior will not be tolerated and is grounds for dismissal from the course, resulting in a grade of F.

COLLEGE AND UNIVERSITY POLICIES

Prerequisites: Students attending the course who do not have the proper prerequisite risk being deregistered from the class.

Academic Honesty: Cheating means to misrepresent the source, nature, or other conditions of your academic work (e.g., tests, papers, projects, assignments) so as to get undeserved credit. In addition, it is considered to be cheating when one cooperates with someone else in any such misrepresentation. The use of the intellectual property of others without giving them appropriate credit is a serious academic offense. It is the University's policy that cheating or plagiarism result in receiving a failing grade for the work or course. Repeat offenses result in dismissal from the University.

Course Withdrawal: For Fall 2013, the course withdrawal deadline is **Sunday, Nov. 3, 2013**.

Students with Disabilities: University policy 3342-3-01.3 requires that students with disabilities be provided reasonable accommodations to ensure their equal access to course content. If you have a documented disability and require accommodations, please contact the instructor at the beginning of the semester to make arrangements for necessary classroom adjustments. Please note, you must first verify your eligibility for these through Student Accessibility Services (contact 330-672-3391 or visit http://www.kent.edu/sas/index.cfm for more information on registration procedures).

Course Registration: Students have responsibility to ensure they are properly enrolled in classes. You are advised to review your official class schedule (using Student Tools on FlashLine) during the first two weeks of the semester to ensure you are properly enrolled in this class and section. Should you find an error in your class schedule, you have until **Sunday, September 8, 2013** to correct the error. If registration errors are not corrected by this date and you continue to attend and participate in classes for which you are not officially enrolled, you are advised now that you **will not** receive a grade at the conclusion of the semester for any class in which you are not properly registered.

Graduation Information: If you are eligible to graduate, it is your responsibility to apply for graduation before the set deadline (**May Graduation**: Apply before September 15th **August Graduation**: Apply before December 15th **December Graduation**: Apply before March 15th). If you apply after the deadline you will be assessed a $200 late fee. Please see your academic advisor as soon as possible if you are uncertain as to your progress toward graduation. To apply for graduation, log onto your Flashline account and complete the following steps:

1. Click on the Student Tools tab
2. Look in the Graduation Planning Tool Box
3. Click on Application for Graduation

If an error message appears, you must contact your advisor.

COURSE MODULES

Module 1: <u>Data & Signal Fundamentals</u>

Refer to Ch. 1-2 & pgs 312-318 & 326-327

Analog & digital data & signals
Digital coding schemes (NRZ-L, NRZI, Manchester, bipolar-AMI, 4B/5B)
Modulation schemes (AM, FM, PM, QAM, PCM)
Internet access alternatives (cable modem, DSL)

Module 2: <u>Conducted & Wireless Communications Media</u>

Refer to Ch. 3 & pgs 116, 264-265, 307-312, 318-319, & 327-330

Transmission media (twisted-pair, coaxial cable, optical fiber, microwave, satellite)
Telephone system, PBXs, Centrex, & unified communications
Wireless communications (cellular, WiMax, WLANs, Bluetooth, ZigBee)

Module 3: <u>Polling, Multiplexing, & Switching</u>

Refer to Ch. 5 & pgs 113-115, 247-252, 261-265, 318-327, & 330-333

Multipoint lines & polling
Multiplexing (FDM, DMT, TDM, T carrier system, ISDN, SONET/SDH, STDM, WDM)
Inverse multiplexing
Circuit & packet (datagram, virtual circuit) switching
Frame relay & ATM (congestion control, QoS, SLAs)

Module 4: <u>Transmission Alternatives, Error Control, & Flow Control</u>

Refer to Ch. 6 & pgs 37-39, 51-57, 64-68, 106, 110-113, & 232-233

HDX, FDX, & simplex transmission
Synchronous transmission & throughput
Noise (white noise, impulse noise, crosstalk, echoes, attenuation, dBs)
Error prevention & detection (parity, checksum, CRC)
Error correction & flow control (stop-and-wait, sliding window)
Data codes (ASCII, EBCDIC, Unicode)

Module 5: <u>LANs & Internetworking</u>

Refer to Ch. 7 & pgs 67-68, 88, 134-136, 208-214, 242-246, 282-283, & 359-368

LAN topologies (bus, tree, star, ring)
Structured cabling systems
CSMA/CD protocol
Ethernet (IEEE 802.3 standards, frame format, shared & switched LANs, VLANs, PoE, MetroE)
Internetworking devices (repeaters, switches, routers, firewalls, MPLS)
Wireless LANs (IEEE 802.11, spread spectrum)

Module 6: <u>Network Architectures, Protocols, & Services</u>

Refer to Ch. 10 & pgs 14-24, 197-198, 252-261, 325-328, & 392-393

IPv4 addressing (classful & CIDR)
OSI & Internet reference models
Internet protocols & services (IPv4, IPv6, TCP, ICMP, UDP, ARP, DHCP, NAT, VPNs, HTTP, DNS, E-mail, FTP, telnet, VoIP, RTP, SNMP, OSPF, RIP, BGP)
Internet2

NOTE: I will make every effort to follow the schedule on page 2 and to cover topics in the order listed above. However, **depending on the pace of the class, we may cover some topics earlier or later than planned**. Any schedule changes will be announced in class, or you will be notified by e-mail.