MSIS-DL 313 Syllabus
Ken Woo
Telecommunications and Computer Networks
Summer 2011

Contact Information
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Course Description
This course provides an overview of telecommunications and data communications. Course work includes local area network (LAN) and wide area network (WAN) components such as switches, routers, telecommunication circuits, and protocols. Advanced topics such as information security, information assurance, advanced networking technologies, and others will be overviewed as well.

Text
Panko, R. R. (2011). *Business data network and telecommunications* (8th ed.). Upper Saddle River, NJ: Prentice Hall. **ISBN-13:** 978-0136100126

Coburn, Pip. (2006). *The change function: Why some technologies take off and others crash and burn.* New York, New York, Portfolio, Penguin Group. (CD summary (cliffnote) version is acceptable and encouraged. See URL below to purchase your versions choice:
http://www.summary.com/summaries/marketing/_/The-Change-Function/?q=the%2bchange%2bfunction

Learning Goals
The goals of this course are to:

- Define the basic terms of computer networks.
- Explain the individual components of computer networks.
- Discuss basic network configurations.
- Determine the best network solution given a set of requirements.
- Create network diagrams, and provide appropriate business rationale.

Evaluation
The student's final grade will be based on the final examination, weekly assignments, discussion board participation, and class projects:

- Eight five-point weekly article research/summaries: 40 points
- Interview with an IT professional: 10 points
- Seven-part course project: 35 points (all parts are worth 5 points)
  - ❖ Network legend
  - ❖ LAN diagram and LAN writeup
  - ❖ WAN diagram and WAN writeup
  - ❖ Future growth/capacity plan
  - ❖ Security plan
  - ❖ Completed case study network diagram with separated and integrated LAN & WAN diagrams. Final paper that coalesces all previous project components, a final project

budget in Excel format, and a recommendation section on how to improve upon the network
- Final exam: 5 points
- Discussion board participation (students will score either 10, 8, 6, 4, or 2 points based on the quality (not quantity) of the posts): 10 points
  Total = 100 points

Discussion Board Etiquette
The purpose of discussion boards is to allow students to freely exchange ideas and participation is highly encouraged. It is important that we always remain respectful of one another's viewpoints and positions and, when necessary, agree to disagree, respectfully. While active and frequent participation is encouraged, cluttering a discussion board with inappropriate, irrelevant, or insignificant material will not earn additional points and may result in receiving less than full credit. Although frequency is not unimportant, content of the message is paramount. Please remember to cite all sources—when relevant—in order to avoid plagiarism.

Proctored Assessment
There is no proctored assessment requirement in this course.

Grading Scale
97%−100% = A
93%−96% = A-
90%−92% = B+
87%−89% = B
80%−86% = B-
77%−79% = C+
73%−76% = C
70%−72% = C-
0%−69% = F

Attendance
This course is primarily asynchronous, however, we will have three (3) or four (4) online synchronous sessions (not mandatory) and these office hour sessions will be recorded. Even though we will not meet face-to-face in a physical classroom, participation on all discussion boards is required and paramount to your success.

Late Work
Late assignments are not accepted without explicit permission from the instructor, and permission can only granted in the case of an emergency. Late work will be subject to a penalty in points.

Learning Groups
There will be no learning groups in this course.

Synch sessions: There will be three office hour sessions for this course. All sessions will be recorded and may be viewed in Blackboard.
Office Session #1 Wednesday June 22, 2011 at 7:15pm Central Time
Office Session #2 Wednesday July 13, 2011 at 7:15pm Central Time
Office Session #3 Wednesday Aug 3, 2011 at 7:15pm Central Time

Academic Integrity at Northwestern
Students are required to comply with University regulations regarding academic integrity. If you are in doubt about what constitutes academic dishonesty, speak with your instructor or graduate coordinator before the assignment is due and/or examine the University Web site. Academic dishonesty includes, but is not limited to, cheating on an exam, obtaining an unfair advantage, and plagiarism (e.g., taking material from readings without citation or copying another student's paper). Failure to maintain academic integrity will result in a grade sanction, possibly as severe as failing and being required to retake the course, and could lead to a suspension or expulsion from the program. Further penalties may apply. For more information, visit: <www.scs.northwestern.edu/student/issues/academic_integrity.cfm>.

Plagiarism is one form of academic dishonesty. Students can familiarize themselves with the definition and examples of plagiarism, by visiting the site <www.northwestern.edu/uacc/plagiar.html>. Myriad other sources can be found online, as well.

Some assignments in this course may be required to be submitted through SafeAssign, a plagiarism detection and education tool. You can find an explanation of the tool at <http://wiki.safeassign.com/display/SAFE/How+Does+SafeAssign+Work>. In brief, SafeAssign compares the submitted assignment to millions of documents in very large databases. It then generates a report showing the extent to which text within a paper is very similar or identical to pre-existing sources. The user can then see how or whether the flagged text is cited appropriately, if at all. SafeAssign also returns a percentage score, indicating the percentage of the submitted paper that is similar or identical to pre-existing sources. High scores are not necessarily bad, nor do they necessarily indicate plagiarism, since the score doesn't take into account how or whether material is cited. (If a paper consisted of just one long quote that was cited appropriately, the score would be 100%. This wouldn't be plagiarism, due to the appropriate citation. However, just submitting one long quote would probably be a pretty bad paper.) Low scores are not necessarily good, nor do they necessarily indicate a lack of plagiarism. (If a 50-page paper had all original material, except for one short quote that was not cited, the score might be around 1%. But, not citing a quotation would still be plagiarism.)

SafeAssign includes an option in which the student can submit a paper and see the resultant report before submitting it to the instructor as a final copy. This ideally will help students better understand and avoid plagiarism.

Other Processes and Policies
Please refer to your SCS student handbook at <www.scs.northwestern.edu/grad/information/handbook.cfm> for additional course and program processes and policies.

Course Schedule

Important Note: Changes may occur to the syllabus at the instructor's discretion. When changes are made, students will be notified via an announcement in Blackboard.

Session 1

Learning Objectives

After this session, the student will be able to:
- Explain the purpose of a computer network.
- Define the term network.
- Explain peer-to-peer and served-based networks.
- Differentiate between telecommunications and data communications.
- Discuss the history of networks.
- Identify the various governmental agencies, regulatory agencies, and standards organizations.
- Describe the role of the various standards organizations.
- List various types of networks.
- Identify the components of a network.
- Explain how the components of a network function together.
- Discuss various types of networks and their use.
- Differentiate between the various types of networks.
- Build a network legend.
- Explain message order, semantics, and syntax.
- Distinguish between connection-oriented and connectionless service.
- Explain the role of software in a network.
- Explain the purpose of protocols.
- Discuss the three key elements of protocols.
- Define and provide examples of reliable and unreliable protocols.
- Describe the Open Systems Interconnection (OSI) model, including the seven layers.
- Explain OSI layers 1 and 2.
- Identify vertical communications among layers.
- Recognize common layered standards and architecture.

Course Content

Reading—For this session, please read:

pp. 1–80 of the textbook:
Panko, R. R. (2011). *Business data network and telecommunications* (8th ed.). Upper Saddle River, NJ: Prentice Hall.

Handout:
    Key Concepts

Video Review over the span of the course:
    Public Broadcasting System's Triumph of the Nerds (Parts I, II, and III)

Web link:
    Public Broadcasting System's Triumph of the Nerds Transcript

Herper, M. (2004, June 11). Doctors, untethered. *Forbes.* Retrieved from
        <www.forbes.com/2004/06/03/cz_mh_wifi04_docs.html>

Web link:
    A comprehensive listing of data communications protocols, their functions in respect to the OSI model, the structure of the protocol, and various errors and parameters

Multimedia:
    The Standard OSI Model

Discussion Board
    Each session you are required to participate in all discussion board forums. Your participation in both posting and responding to other students' comments is graded. For this week's discussion topic(s), visit the discussion board in Blackboard.

Assignment
    Case Study Selection is due by Sunday, June 26, 2011 at 11:55 p.m. (central time). For more information, click *Assignments* on the left navigation bar in Blackboard, and scroll to this assignment's item.

    Project Part I is due by Sunday, June 26, 2011 at 11:55 p.m. (central time). For more information, click *Assignments* on the left navigation bar in Blackboard, and scroll to this assignment's item.

Session 2

Learning Objectives
After this session, the student will be able to:
- Discuss binary data representation, including its use in most present-day networks.
- Distinguish between unshielded twisted pair (UTP) and fiber optic wiring.
- Identify relevant propagation effects that must be controlled during connectorization.
- Explain how to mitigate various propagation effects during connectorization.
- Explain the differences and uses between Cat 3, Cat 4, Cat 5, Cat 5e, Cat 6, augmented Category 7, and Cat 7.
- Explain the benefits and drawbacks of using UTP versus optical fiber.
- Identify various network topologies.
- Describe each network topology.

Course Content
Reading—For this session, please read:

pp. 147-155 and 167–204: Panko, R. R. (2011). *Business data network and telecommunications* (8th ed.). Upper Saddle River, NJ: Prentice Hall.

Shah, A. (2008, December 6). Intel hopes to bring free energy to mobile devices. *IT World.* Retrieved from: http://www.itworld.com/personal-tech/58871/intel-hopes-bring-free-energy-mobile-devices?source=itw_rss

Mark, R. (2009, December 10). Obama dedicates $88M more for health it. Retrieved from: http://www.eweek.com/c/a/Health-Care-IT/Obama-Dedicates-88M-More-for-Health-IT-368534/

Handout:
Telecommunications and Computer Networks

Multimedia:
Network Topologies

Discussion Board
Each session you are required to participate in all discussion board forums. Your participation in both posting and responding to other students' comments is graded. For this week's discussion topic(s), visit the discussion board in Blackboard.

Assignment
The weekly article submission is due by Tuesday, July 5, 2011 at 11:55 p.m. (central time). For more information, click *Assignments* on the left navigation bar in Blackboard, and scroll to this assignment's item.

Session 3

Learning Objectives

After this session, the student will be able to:

- Discuss the various types of LANs.
- Identify Ethernet physical layer standards.
- Explain the function of the media access control (MAC) layer.
- Differentiate between Ethernet switch and hub.
- Identify Ethernet switch purchasing criteria
- Discuss token ring networks.
- Explain the benefits and drawbacks of a token ring network.

Course Content

Reading—For this session, please read:

pp. : 167-170 and 205-239 Panko, R. R. (2008). *Business data network and telecommunications* (7th ed.). Upper Saddle River, NJ: Prentice Hall.

Coburn, P. (2006, May 1). The change function. *Fast Company*. Retrieved from http://www.fastcompany.com/magazine/105/next-essay.html

Helft, M., & Bilton, N. (2010, April 19). For Apple, lost iPhone is a big deal. *The New York Times.* Retrieved from http://www.nytimes.com/2010/04/20/technology/companies/20apple.html

Livescience. (2007, March 25). iPods help doctors recognize heart problems. *Livescience.* Retrieved from http://www.livescience.com/technology/070325_ipod_heart.html

McCullagh, D., & Sandoval, G. (2010, May 14). Apple spurred police in iPhone probe. *CNET.* Retrieved from http://news.cnet.com/8301-13579_3-20005018-37.html

Chen, J. (2010, April 19). This is Apple's next iPhone. *Gizmodo.* Retrieved from http://gizmodo.com/5520164/this-is-apples-next-iphone#

Multimedia:
Physical Diagramming v. Logical Diagramming

Discussion Board

For this week's discussion topic(s), visit the discussion board in Blackboard.

Assignment

The weekly article submission is due by Sunday, July 10, 2011 at 11:55 p.m. (central time). For more information, click *Assignments* on the left navigation bar in Blackboard, and scroll to this assignment's item.

Session 4

Learning Objectives

After this session, the student will be able to:

- Define a metropolitan area network (MAN).

Course Content:

Reading—For this session, please read:

pp. 239-277: Panko, R. R. (2011). *Business data network and telecommunications* (8th ed.). Upper Saddle River, NJ: Prentice Hall.

Versweyveld, L. (2002, January 24). First all-digital Indiana heart hospital takes off in December 2002. *Virtual Medical Worlds.* Retrieved from http://www.hoise.com/vmw/02/articles/vmw/LV-VM-03-02-16.html

Kolakowski, N. (2009, December 10). Microsoft to acquire health care IT company sentillion. Retrieved from: http://www.eweek.com/c/a/Windows/Microsoft-Acquires-Health-Care-IT-Company-Sentillion-570408/

Discussion Board

Each session you are required to participate in all discussion board forums. Your participation in both posting and responding to other students' comments is graded. For this week's discussion topic(s), visit the discussion board in Blackboard.

Assignment

The weekly article submission and Project Part II are due by <u>Sunday, July 17, 2011 at 11:55 p.m.</u> (central time). For more information, click *Assignments* on the left navigation bar in Blackboard, and scroll to this assignment's item.

Session 5

Learning Objectives

After this session, the student will be able to:

- Define WAN.
- Explain the three purposes of WANs.
- Discuss leased line networks including leased line speeds.
- Describe leased line network topologies.
- Compare leased lines to digital subscriber lines (DSL).
- Explain the reason(s) for the dominance of low-speed transmissions in WAN services.
- Identify public switched data networks (PSDNs).
- Compare and contrast various PSDNs.
- Discuss 802.11 wireless LAN (WLAN) standards.
- Discuss how 802.11 WLAN supplements wired LANs.
- Explain the differences and uses of licensed and unlicensed radio bands.
- Discuss radio frequencies used in WAN.
- Discuss the use of satellite and microwave.
- Explain the importance of line of sight in a WAN.
- Explain the differences between and uses of WLAN, Ultraband (UWB), and Bluetooth personal area network (PAN).
- Explain virtual private networks (VPNs).
- Explain the purpose of a site survey when installing wireless access points.

Course Content

Reading—For this session, please read:

pp. 278-304: Panko, R. R. (2011). *Business data network and telecommunications (8*th ed.). Upper Saddle River, NJ: Prentice Hall.

Svensson, P. (2009, January 28) Cox to test new way to handle internet congestion Retrieved from: http://www.usatoday.com/tech/products/2009-01-28-cox-net-neutrality_N.htm

Discussion Board

Each session you are required to participate in all discussion board forums. Your participation in both posting and responding to other students' comments is graded. For this week's discussion topic(s), visit the discussion board in Blackboard.

Assignment

The weekly article submission and Project Part III are due by Sunday, July 24, 2011 at 11:55pm (central time). For more information, click *Assignments* on the left navigation bar in Blackboard, and scroll to this assignment's item.

Session 6

Learning Objectives
After this session, the student will be able to:
- Describe the transmission control protocol/Internet protocol (TCP/IP) standards architecture.
- Explain the dominance of the hybrid TCP/IP-OSI standards architecture.
- Explain IP addressing.
- Explain the use of a subnet mask.
- Explain the two TCP/IP transport layer protocols (TCP and UPD).
- Identify and explain TCP/IP-based protocols (FTP and Telnet).
- Explain the purpose of use of the H.323 protocol (often use UDP and include voice over Internet protocol (VoIP) and streaming media).
- Identify the network layer protocol used in TCP/IP (IP-IPv6).
- Describe packet switching.
- Explain latency and jitter.
- Explain the "TCP three-way handshake" and the "TCP keep-alive process."
- Demonstrate how to use packet internetwork groper (PING).
- Explain the purpose of a protocol analyzer.
- Describe the basic elements of a protocol analyzer.
- Explain the purpose of remote monitoring (RMON).
- Explain the role of simple network management protocol (SNMP).
- Explain the role of routing information protocol (RIP).
- Explain the purpose of an application server.
- Explain client/server architecture including advantages and disadvantages.
- Explain peer-to-peer (P2P) applications including advantages and disadvantages.
- List examples of client/server and P2P applications.
- Discuss electronic mail standards.
- Describe some of the business issues with instant messaging.

Course Content

Reading—For this session, please read:

pp. 305–336: Panko, R. R. (2011). *Business data network and telecommunications* (8th ed.). Upper Saddle River, NJ: Prentice Hall.

Sutter, J. (2009). Google analyst: U.S. internet needs to get faster. Retrieved from: http://www.cnn.com/2010ITECH/02/08/google.policy/index.html?hpt=C1

Web link:
A comprehensive listing of data communications protocols, their functions in respect to the OSI model, the structure of the protocol, and various errors and parameters

Discussion Board

Each session you are required to participate in all discussion board forums. Your participation in both posting and responding to other students' comments is graded. For this week's discussion topic(s), visit the discussion board in Blackboard.

Assignment

The weekly article submission is due by Sunday, July 31, 2011 at 11:55 p.m. (central time). For more information, click *Assignments* on the left navigation bar in Blackboard, and scroll to this assignment's item.

Session 7

Learning Objectives

After this session, the student will be able to:

- Identify the types of data that travel via the public switched telephone network (PSTN).
- Explain how the PSTN works.
- Explain the differences between packet switching and circuit switching.
- Explain the difference between full duplex and half duplex.
- Discuss the impact of 3G and 4G on telecommunications.
- Describe and give an example of a wireless metropolitan area network (WMAN).
- Discuss VoIP.
- Explain the benefits and issues in using VoIP.

Course Content

Reading—For this session, please read:

pp. 337–361: Panko, R. R. (2008). *Business data network and telecommunications* (7th ed.). Upper Saddle River, NJ: Prentice Hall.

The Associated Press. (2009, April 20). Oracle buys Sun Microsystems for $7.4B. *CBS News.* Retrieved from http://www.cbsnews.com/stories/2009/04/20/business/main4956050.shtml

Fryer, B., & Stewart, T. A. (2008, November). Cisco sees the future: An interview with John Chambers. *Harvard Business* Review. Retrieved from http://hbr.org/2008/11/cisco-sees-the-future/ar/1

Video:
The eBay Effect: Part 1

Discussion Board

Each session you are required to participate in all discussion board forums. Your participation in both posting and responding to other students' comments is graded. For this week's discussion topic(s), visit the discussion board in Blackboard.

Assignment

The weekly article submission, Project Part IV, and Article Response and Interview with an IT Professional are due by Sunday, August 7, 2011 at 11:55 p.m. (central time). For more information, click *Assignments* on the left navigation bar in Blackboard, and scroll to this assignment's item.

Session 8

Learning Objectives

After this session, the student will be able to:

- Discuss basic principles of network management.
- Explain the purpose of PING, NSLOOKUP, NETSTAT, IPconfig, and Traceroute.
- Explain why security is a management and not a technical issue.
- Identify security threats
- Classify types of attacks.
- Discuss principles of security planning.
- Describe various authentication mechanisms.
- Explain the purpose and use of firewall protection.
- Evaluate compromise responses.

Course Content

> *Reading—For this session, please read:*
> pp. 87-131: Panko, R. R. (2011). *Business data network and telecommunications* (8th ed.). Upper Saddle River, NJ: Prentice Hall.

Feretic, E. (2008). Best practices for authenticating mobile workers and securing data access. Retrieved from: www.securecomputing.com ZiffDavisEnterprises, Inc.

> Multimedia:
> Issues in Home and Office Security

Discussion Board

> Each session you are required to participate in all discussion board forums. Your participation in both posting and responding to other students' comments is graded. For this week's discussion topic(s), visit the discussion board in Blackboard.

Assignments

> The weekly article submission and Project Part V are due by Sunday, August 14, 2011 at 11:55 p.m. (central time). For more information, click *Assignments* on the left navigation bar in Blackboard, and scroll to this assignment's item.

Session 9

Learning Objectives

After this session, the student will be able to:

- Identify challenges in telecommunication and network technology that still exist today (security, efficiency, productivity, training, and the overall business process).
- Evaluate how challenges in telecommunication and network technology can be overcome.
- Discuss developments in telecommunication and network technology that are on the horizon.
- Identify potential careers in the networking industry.

Course Content

Reading—For this session, please read:

pp. 362-405: Panko, R. R. (2011). *Business data network and telecommunications* (8th ed.). Upper Saddle River, NJ: Prentice Hall.

CNN. (2008, November 14). Second life affair ends in divorce. *CNN.* Retrieved from: http://www.cnn.com/2008/WORLD/europe/11/14/second.life.divorce/index.html

Discussion Board

Each session you are required to participate in all discussion board forums. Your participation in both posting and responding to other students' comments is graded. For this week's discussion topic(s), visit the discussion board in Blackboard.

Assignment

Project Part VI and Part VII and the final exam are due by Sunday, August 21, 2011 at 11:55 p.m. (central time). For more information, click *Assignments* on the left navigation bar in Blackboard, and scroll to this assignment's item.