ECE477 - Network Engineering

Fall Semester 2017

Description:
This course provides an introduction to the principles and practice of network engineering. The ISO-OSI reference model is introduced and used a framework for examining internetwork communication issues. Both connection-oriented and connectionless network paradigms are examined including their use in wide area networks (WANS) and high-speed networks. Topics include:

- The physical aspects of local area networks (LANs)
- Encoding, framing and error detection
- Ethernet and IEEE 802 LANs
- Bridges, switches, and extended LANs
- Wireless networks (802.11 and 3G/4G LTE)
- Gigabit networks
- Packet switching and forwarding
- Routing and addressing
- Internetworking
- End-to-end protocols

Instructor:
Timothy York
Office:
Engineering Building 3042
Office Hours:
Formally T,R: 3:00 pm – 4:30 pm. If I'm in my office any other time, you are more than welcome to swing by and ask for help, discuss anything, drag me into lab, etc. During these times, I might be working on other things (ie. grants/papers/administrative paperwork/class prep) which have hard deadlines, so I cannot guarantee that I can immediately help you. If this is the case, I will make every reasonable effort the see to you as soon as possible, but usually this is pretty rare.
E-mail:
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Office 650-2615
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Max Harres
Class web site:
http://www.siue.edu/~tyork/classes/ece477 , Mirrored to One Drive share (link forthcoming)
Required texts:
Computer Networking: A Top-Down Approach (7th Edition) by Kurose & Ross. Published by Pearson, ISBN 0-13-359414-9

Class Policy:

Attendance:

Class attendance is not mandatory, however you may be dropped from the class roster for any of the following:

- Failure to attend the first scheduled class.
- Missing a test or quiz without an acceptable excuse.
- Missing more than 1 week of class or 6 nonconsecutive classes throughout the semester without notifying the instructor beforehand in writing that you intend to do so.

It is your responsibility to mark your name off on any attendance sheet that is handed out in class. Long term absences should be reported to the Office of Dean of Students (618)650-2020, which will send a written notice to all of your instructors and save you the burden of contacting them individually. You are expected to be in class on time. Habitual tardiness may result in the instructor asking you to to justify your continuation in the course. Notify the instructor in writing beforehand if you have extenuating circumstances that will consistently make you late.

Reading Assignments:

Reading assignments will be made regularly throughout the semester. It is essentially that you read the assigned sections by the date indicated by the instructor. Unannounced quizzes may be given that cover material in the reading assignment.

Homework and Reports:

Homework and lab assignments will be assigned throughout the semester, They are due on the date announced. Late submissions will not be accepted and a score of zero will be recorded. Students with excused absences will be given a reasonable period of time to catch up on their work with no penalty.

Quizzes:

I reserve the right to hold unannounced quizzes at any point during the semester, which would cover material from the previous lecture or the assigned reading. No makeup quizzes will be given, however, if you have an excused absence, you will not be penalized.

Exams:

There will be three exams and a comprehensive final during the semester. They will consist of multiple choice, short answer, or essay questions, and may even include a practical portion to demonstrate proficiency on a lab. Graduate students will have extra questions for each exam.

If for any reason you are unable to take a exam or quiz, you should advise the instructor before the exam. There are no make up examinations. The percentage weightings for calculation of the course grade will be adjusted so that any exam missed for an acceptable reason will not result in a penalty in grading. An unexcused absence for an exam or quiz will result in a score of zero and you may be dropped from the course.

No graphing calculators, smartphones, smart watches, PDAs, cell phones, handheld computers, etc. are allowed for quizzes or exams, and any use of such a device will be considered cheating. Only calculators approved for the FE exam (http://ncees.org/exams/calculator/) or comparable calculators approved by me will be allowed (You must show me the calculator before the exam).

Grading:

All grading will consider (but will not necessarily be limited to) use of correct theory or equation, proper application of theory or equation, neatness, organization, necessary assumptions, mathematical correctness, proper degree of accuracy, adequate labeling or sketches, references to design charts or tables, and correct conclusion.

Partial Credit

If your proposed solution to a particular problem clearly shows that you understand all the concepts involved in solving the problem, but you have made a minor, non-conceptual, error, such as mis-reading a dimension or failing to convert units correctly, then you will receive partial credit for your work. Partial credit is not, however, awarded for a proposed solution which does not demonstrate knowledge of all the concepts required to solve the problem.

If, in answering any question, you state something that is incorrect, you will be penalized regardless if you have also put down the correct answer. Partial credit is not negotiable. However, if a math error has been made in totaling the points on an exam or homework please feel free to bring it to my attention.

Grading Scheme:

Labs, Homework, Quizzes	20%	**A: >= 90%**
Exam 1	20%	**B: 89%-80%**
Exam 2	20%	**C: 79%-70%**
Exam 3	20%	**D: 69%-60%**
Final Exam	15%	**F: < 60%**
Class Participation	5%	

Extra Credit:

On occasion, extra credit homework and projects may be offered. These are not required and you will not be penalized by not doing them. However, if you are concerned about your grade I strongly encourage you to work these as they are made available. No late extra credit assignments will be accepted.

Joint Work and Outside Help:

The ability to share common interests and ideas is a valuable tool for learning. I encourage you to discuss your homework and lab assignments with your fellow students, and to seek outside help when you do not understand something. However, I insist you abide by two rules: First, you must always make a serious attempt to understand the problem and a reasonable attempt to solve it by yourself. Second, you must completely understand your solution method for whatever you turn in; I may challenge you to explain it. If you do not understand your own solution any credit you may have received on the assignment will be revoked and you will not be given any credit for the homework or lab problem, even if the answer you have is correct. **If it is apparent to me that all you did was copy your neighbor, you will receive a 0 for you lab assignment!**

Furthermore, plagiarism and cheating will not be tolerated in any form and the strongest penalties will be imposed. The following description is taken from the Student Academic Code:

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The University gives high priority to matters of academic ethics and abhors all
types of cheating, including plagiarism. Plagiarism is the act of representing the
work of another as one's own and may consist of copying, paraphrasing, or otherwise
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using written or oral work of another without proper acknowledgment of the source or presenting oral or written material prepared by another as ones own. Instructors may impose sanctions for academic cheating in accordance with the Student Academic Code. The minimum penalty for academic misconduct beyond failure for an assignment and/or for a course is disciplinary probation.

Plagiarism also includes taking material from a web site and submitting it as part of a report or assignment, without acknowledging the source of the information. It's fine to Google things, it's a great way to figure out how to do the assignment and is most likely what you will do in a work environment. Just give the URL or reference of any guide or handbook page you used in your report!

Disability Services

If you are a student with a disability that requires curricular or co-curricular accommodations, please go to Disability Support Services for coordination of these accommodations. All accommodations are individualized and require documentation of the functional impacts of the disability and severity. DSS is located in the Student Success Center, Room 1270; you may contact them to make an appointment by calling (618) 650-3726 or sending an email to disabilitysupport@siue.edu. Please visit the DSS website located online at www.siue.edu/dss for more information.

Some things in this syllabus may change as the semester proceeds. Any such changes will be discussed in class.

Week	Planned Topic	Date
Week 1	Syllabus, Ch 1: Intro to Networking Concepts, OSI-Stack, What is the Internet?	Aug. 22, 2017
	What really happens when I go to the class web page?	Aug. 24, 2017
Week 2	Ch 1: Network Edge (Access Networks/Physical Media), Network Core	Aug. 29, 2017
	Ch 1: Network Core, cont., Delay, Loss, and Throughput in Packet-Switched Networks	Aug. 31, 2017
Week 3	Ch 1: Protocol Layers, Service Models, Intro. To Security, Internet History	Sept. 5, 2017
	Ch 2: Application Layer (Principles of Net. Apps), The Web and HTTP, DNS	Sept. 7, 2017
Week 4	Ch 2: DNS cont., E-Mail, Peer-to-Peer Apps, Content Distribution Networks and Streaming	Sept. 12, 2017
	Ch 2: CDNs, netcat, Socket Programming (Python Examples)	Sept. 14, 2017
Week 5	Problem Session, Ch 3: Transport Layer, Muxing/Demuxing Streams	Sept. 19, 2017
	EXAM 1 (Ch 1 & 2: Networking Concepts & Application Layer)	Sept. 21, 2017
Week 6	Ch 3: UDP (Connectionless Transport)	Sept. 26, 2017
	Ch 3: UDP cont., Principles of Reliable Data Transfer	Sept. 28, 2017
Week 7	Ch 3: TCP (Connection-Oriented Transport)	Oct. 3, 2017
	Ch 3: TCP cont, Congestion Control	Oct. 5, 2017
Week 8	Ch 4: Network Layer (Overview, What's Inside a Router?)	Oct. 10, 2017
	Ch 4: Queuing, Internet Protocol (IP)	Oct. 12, 2017
Week 9	Ch 4: IP continued (Subnetting, NAT, IPv6), Routing	Oct. 17, 2017
	Ch 5: Dynamic Routing (RIP, OSPF, BGP)	Oct. 19, 2017
Week 10	Problem Session, Ch 6: The Link Layer and LANs (Intro, Error-Detection & Correction)	Oct. 24, 2017
	EXAM 2 (Ch3 & Ch 4, Ch 5: UDP/TCP/IP, Routing)	Oct. 26, 2017
Week 11	Ch 6: Multiple Access Links and Protocols, Hubs & Switches	Oct. 31, 2017
	Ch 6: Ethernet	Nov. 2, 2017
Week 12	Ch 6: ARP, VLANs	Nov. 7, 2017
	Ch 7: Wireless Networks (Intro, Links & Net. Characteristics)	Nov. 9, 2017
Week 13	Ch 7: Wireless Networks (WiFi, 802.11 Wireless LANs)	Nov. 14, 2017
	Ch 7: Wireless Networks (Cellular Internet Access)	Nov. 16, 2017
BREAK	BREAK – NO CLASSES!	Nov 19-25
Week 14	Problem Session, Ch 8: Network Security (Public Key Infrastructure, SSL/TLS)	Nov 28. 2017
	EXAM 3 (Ch 6 & 7, Physical Layer & Wireless Networks)	Nov 30, 2017
Week 15	Ch 8: Network Security cont. (WLAN Security, Firewalls, VPNs)	Dec. 5, 2017
	Revisit "What Really Happens When I Go To The Class Web Page"	Dec. 7, 2017
Week 16	Final Exam - 4:30 – 6:10 pm, EB 3012 (Comprehensive)	Dec. 12, 2017

This schedule is preliminary and may be changed as the semester goes on. Any changes will be discussed in class.

Any changes made to the syllabus will be discussed in class and will supersede those written here.