ROLLINS COLLEGE

CMS 450: Computer Networks
Fall Semester 2013 4 credits
Meets: M/W 7-8:15pm
302 Bush Science Center

Instructor: [i]Jennifer Seitzer, Ph.D.
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Phone: 407-646-2303

***Office Hours**:

- Mon/Wed: 3:30-5pm;
- Wed: 8:30pm – 9:30pm
- Tues/Thurs: 9:30am-10:30am

*These are tentative and will possibly change due to departmental meetings and other college events as they arise.

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COURSE DESCRIPTION

Rollins College Catalog Description:

Study of the technology, architecture, and software used by systems of network-connected computers. Topics include data transmission, local area network architectures, network protocols, inter-networking, distributed systems, security, and network applications such as email, WWW, and FTP. Students will develop programs that run concurrently on multiple computers.

Prerequisite: **CMS 330** System Software Principles

Motivation:

In this course, we study what is required to make the Internet go! In particular, we learn about computer networking, which is the area of computer science that examines how information, in the form of bits, travels over some medium from a source to a destination. We will look at the underlying hardware and software, the services it offers, and the applications it runs.

To structure our exploration, we will use the TCP/IP reference model and its protocols as our guide in discovering "what is inside the Internet?" Interestingly, we will approach this study from the top-down, first examining the Application Level (layer 5 of the model) and proceeding downward to the physical layer (layer 1). The application layer is where the vast majority of human interest lies. Activities such as smart-phone Apps, email, web browsing, and video and audio streaming take place at the application level. We will probe into the underlying paradigm of client-server interaction, and how transport level (layer 4) protocols realize this. Wide area networks (WANs) allow connected nodes to grow as needed and are constructed by interconnecting many packet switches (layer 3). We will look at local area networks (LANs) and place an emphasis on Ethernet technology (layers 2 and 1).

To consider computer networking from a local perspective, we will have lab assignments using a network sniffer called Wireshark that will allow us to examine the many different packets traversing the net; to study computer networking from a global perspective we will use simulation tools to delve into some of the overarching problems of effectively managing a computer network. Welcome!

Objectives:

- To learn much of the terminology and acronyms that permeate the field of Networking.
- To understand and use the client-server paradigm in Networking's highest level: Applications
- To describe standard LANs and WANs, identifying the advantages and disadvantages of each
- To exhibit a basic knowledge of protocols of the TCP/IP internetworking protocols.
- To create packet analyses using the Wireshark network analyzer
- To create simple simulations of various network scenarios using high level languages and/or IT Guru network modeler.

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Types of Learning Experiences and Assessment Procedures:

Several different learning experience methods and assessment techniques will be employed in this course:

1. **Class Sessions:** used to discuss and reflect on concepts identified from your "concept gathering activity" to ensure your understanding. Frequent discussion questions, problem solving, and design analyses will allow you to apply and work with Networking concepts and algorithms. I use Power Point slides and handouts to help guide our discussions. The slides will be available on Blackboard for you to print out if you wish.
2. **Homework Activities**: used to ensure you comprehend the new concepts and are making adequate progress by solving problems. We will have a variety of assignments. Some will be group-oriented and collaborative in nature. Others will be individual assignments to be completed independently.
3. **Quizzes**: used to ensure your comprehension of the current concepts. Quizzes will be scheduled for every Monday. Quizzes will be ***open-note*** and may be completed with the use of the notes you include on your slide handouts, program journal, and/or notebooks. You may use paper materials only including your textbook; no laptops, smartphones, IPADs or other electronic devices are allowed during quizzes and tests.
4. **Lab/Programming Activities**: used to allow you to experiment with computer networking concepts/techniques. We will have several networking projects including packet analyses, simulations, and client-server programs. You may write these programs in C, C++, or Java.
5. **Exams**: used to assess your ability to integrate and apply your new knowledge of Computer Networking principles, problems, and algorithms. There will be two mid-terms and a final - taken with the use of your textbook, slide handouts, program journal, and/or notebooks (again, no electronic devices).

Suggestions for being successful:

1. **Stay open. Be willing to do the work to learn.** Your future success in the information technology fields will increasingly depend on your openness and willingness to learn new things: new languages, new architectures, new algorithms, etc.
2. **Do the reading *before* class.** The weekly reading assignment is posted on the Course Calendar (below) and specifies the reading to be done and understood. As you read/study, flag those concepts that aren't clear to you – this way you come to class with a set of questions for us to *discuss* and resolve. It has been thoroughly proven that successful students have questions – and *actively* seek the answer.
3. **Attend every class; refer to Blackboard frequently.** You can contact me by e-mail or by phone here at Rollins. Finally, you should use each other as resources; you can use BlackBoard to send email to your classmates.

COURSE CALENDAR (TENTATIVE LIST AND SCHEDULE OF COVERAGE):

Week	Date	Topics	Assigned Reading (to be performed before class)
1	**1- Mon - 08/26/2013**	Introduction…What is the Internet? Network Core; Network Edge	Preface; Chapter 1.1 -1.3
	2- Wed - 08/28/2013	Packets and Protocols	Chapter 1.4 -1.6
2	**☺ Mon - 09/02/2013**	**No Class – Happy Labor Day!**	
	3- Wed - 09/04/2013	**Layer 5: The Application Layer**	Chapter 2.1
3	**4- Mon - 09/09/2013**	The World Wide Web; HTTP, HTML, Web Caching	Chapter 2.2
	5- Wed - 09/11/2013	Domain Name System; The Interaction of DNS with Apps	Chapter 2.4, 2.5
4	**6- Mon - 09/16/2013**	Sockets and TCP	Chapter 2.7
	7- Wed - 09/18/2013	Sockets and UDP	Chapter 2.8
5	**8- Mon - 09/23/2013**	**Layer 4: The Transport Layer**	Chapters 3.1-3.3
	9- Wed- 09/25/2013	Reliable Transmission	Chapter 3.4
6	**10- Mon - 09/30/2013**	**Midterm 1**	Re-read covered sections of text
	11- Wed - 10/02/2013	More Reliable Transmission; Go Back N; Selective Repeat	Read Chapter 3.4 again
7	**12- Mon - 10/08/2013**	Transmission Control Protocol (TCP)	Chapter 3.5
	13- Wed - 10/10/2013	TCP Control; flow control; connection management; Three-way handshake	Read Chapter 3.5 again
8	**☺- Mon - 10/15/2013**	**MIDTERM BREAK – NO CLASS**	A good novel .☺
	14- Wed - 10/17/2013	TCP Congestion	Chapters 3.6 and 3.7
9	**15- Mon - 10/22/2013**	**Layer 3: The Internetworking Layer**	Chapters 4.1-4.3
	16- Wed - 10/24/2013	Internet Protocol (IP); datagram packet; IP addressing.. dotted decimal notation	Chapter 4.4
10	**17- Mon - 10/29/2013**	More Layer 3 protocols: NAT, ICMP, IPv6; colon-hex notation	Read Chapter 4.4 again
	18- Wed - 10/31/2013	Introduction to Routing; RIP, OSPF, BIG	Chapters 4.5 and 4.6
11	**19- Mon - 11/05/2013**	Review for Midterm	Study Chapters 3.5 – 4.6
	20- Wed - 11/07/2013	**Midterm 2**	Re-read covered sections of text
12	**21- Mon - 11/12/2013**	**Layer 2: The Datalink/Link Layer**	Chapters 5.1 and 5.2
	22- Wed - 11/14/2013	Local Area Networks; CSMA/CD	Chapter 5.3 and 5.4
13	**23- Mon - 11/19/2013**	Ethernet; Combining the Layers	Chapter 5.4.2; Chapters 5.7 and 5.8
	24- Wed - 11/21/2013	Wireless Networking	Chapters 6.1-6.3
14	**25- Mon - 11/26/2013**	Cellular Internet Access; Mobile IP	Chapters 6.4 -6.7
	☺- Wed - 11/28/2013	Thanksgiving Break ***Happy Thanksgiving!***	**A good novel ☺**
15	**26- Mon - 12/03/2013**	Network Security	8.1-8.2
	27- Wed - 12/05/2013	More Security	8.3-8.5
16	**28- WEDNESDAY December 11, 2013**	**Cumulative Final 7-8:15pm**	All covered material

COURSE RESOURCES

Required Textbook:

Computer Networking A Top-Down Approach – Sixth Edition
By, James F. Kurose and Keith W. Ross
copyright 2013; Published by Pearson Education
ISBN: 978-0-13-285620-1; Retail: $152.00

Programming Environments

The network analyzer, Wireshark, will be used for packet analysis. Additionally, you will have the choice of using C, C++, or Java for our programming assignments. IT Guru will be used for network simulation projects. Downloadable interpreters/compilers will be made available on our Blackboard site for download. Moreover, documentation and reading materials will also be made available.

COURSE MECHANICS

Using BlackBoard for your Preparation

The CMS 450 BlackBoard Web Site has a **Weekly Lessons** Section containing each week's lecture slides, reading assignments, points of emphasis, and homework/programming assignments. It is your responsibility to review each week's content folder often (sometimes the activities are revised to better reflect our progress).

Grading *(Approximate distribution of credit)*:

ITEM	PERCENTAGE
Midterm 1	16%
Midterm 2	16%
Final Exam	20%
Quizzes	20%
Assignments and Programs	20%
In-Class Grade	8%

Grading Scale:

93-100	A
90-92	A-
87-89	B+
83-86	B
80-82	B-
77-79	C+
73-76	C
70-72	C-
67-69	D+
63-66	D
60-62	D-
< 60	F

Final Grades and Academic Warnings

Your final average will determine your course grade from the above scale. Your final course grade is strongly influenced by your *class participation* and *attendance*. Grades on all activities will be posted in BlackBoard's Grade Book, so you will always be able to determine your class standing. An academic warning will be dispensed whenever a student's grade falls below a C. Please understand that this is not meant to be punitive, but rather, is meant to help start the process of restoring the student's success in this field of study.

Academic Honor Code

- Membership in the student body of Rollins College carries with it an obligation, and requires a commitment, to act with honor in all things. Because academic integrity is fundamental to the pursuit of knowledge and truth and is the heart of the academic life of Rollins College, it is the responsibility of all members of the College community to practice it and to report apparent violations.

- The following pledge is a binding commitment by the students of Rollins College:

- The development of the virtues of Honor and Integrity are integral to a Rollins College education and to membership in the Rollins College community. Therefore, I, a student of Rollins College, pledge to show my commitment to these virtues by abstaining from any lying, cheating, or plagiarism in my academic endeavors and by behaving responsibly, respectfully and honorably in my social life and in my relationships with others.

- This pledge is reinforced every time a student submits work for academic credit as his/her own. Students shall add to all papers, quizzes, tests, lab reports, etc., the following handwritten abbreviated pledge followed by their signature:

"On my honor, I have not given, nor received, nor witnessed any unauthorized assistance on this work."

- Material submitted electronically should contain the pledge; submission implies signing the pledge.

Absence and Tardiness Policies:

You are expected to attend all classes and hand in all assignments on time. I regard this behavior as the sign of a serious student. If you are absent, it is your responsibility to get with a classmate and go over what happened in class. Since we are solving new problems during each class, it is critical that you get this information. If the Dean of Students or Athletic Director approved your absence in advance, assignments due must be completed prior to the absence. If you are tardy, please try to slip into class as unobtrusively as possible.

The exams are noted on the class calendar. If you must be absent on an exam day, it is your responsibility to arrange with me to take the exam early.

Late Submissions:

I expect activities to be turned in when due. Due dates for your activities also have a *time* when they are due. If you must be absent on an activity's scheduled due date/time, it is your responsibility to still get the material to me by its scheduled time or earlier. Using the BlackBoard Assignment feature to submit your work will facilitate your timeliness. Homework Problems due on a date when you have an approved absence (see Absence/Tardy Policy) must be turned in prior to the posted due date. Again, homework will be turned in using BlackBoard unless otherwise specified.

Academic Accommodation / Disability Services:

Rollins College is committed to equal access and does not discriminate unlawfully against persons with disabilities in its policies, procedures, programs or employment processes. The College recognizes its obligations under the Rehabilitation Act of 1973 and the Americans with Disabilities Act of 1990 to provide an environment that does not discriminate against persons with disabilities.

If you are a person with a disability on this campus and anticipate needing any type of academic accommodations in order to participate in this course, please make timely arrangements by disclosing this disability in writing to the Disability Services Office at (Box 2613) - Thomas P. Johnson Student Resource Center. Appointments can be scheduled by calling 407-646-2354 or email: gridgeway@rollins.edu

Communications:

We will be using email and the Internet (BlackBoard Web Site) as our primary communication techniques. I will respond to your emails as soon as I can – usually 24-hour turnaround or less. Learn how to use the Rollins network to both communicate with me and your classmates as well as to store your programs on the 'R' drive (r-share).

I will use your BlackBoard email address. Be sure and set up your Personal Information on BlackBoard to use the email address you check regularly – even if it is your Rollins account. BlackBoard may not automatically capture your Rollins email address. "I never got your email" is not an acceptable excuse - except for the rare times when the Rollins server is down.

Last Date to Withdraw Without Academic Penalty: Friday, November 1, 2013

Laptops and Cell Phones in Class:

Learning is exciting and hard work. I view our classroom as a place where we are heavily engaged in the business of learning a difficult subject. Interruptions from cell phones are a sign of disrespect toward your classmates and me**. No texting—ever. No reading texts: No writing texts**. ***Turn your cell phones off completely before we start to work***.

Laptops may be used for our classwork only. Surfing the web or working on assignments for other classes is not allowed. To learn the material necessary to succeed in this class, you need to be focused on the class activity – and not on CNN, Sports Center, or Facebook.

The Internet is one of the most profound artifacts of humanity. It enables us to transcend physical distance and makes available ideas, connections, and opportunities that might not have been otherwise possible. This course allows us to understand and improve the Internet. Welcome to class! Jennifer Seitzer, Ph.D.

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[i] A huge Thank you to Dr. R. H. James, the former professor of this course, for so generously sharing his wonderful resources with me.