**CSCI 6345**

**ADVANCED COMPUTER NETWORKS**

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**Required Textbook**: Comer, Douglas E., Computer Networks and Internets, 6th Edition, Prentice Hall, 2015.

ISBN-10: 0133587932 **(**ISBN-13: 978-0133587937**)**

**Please take good notes as I cover a great deal more than in the textbook.**

**Reference:**

* Behrouz A. Forouzan, TCP/IP Protocol Suite, 4th Ed., McGraw Hill, 2010. ISBN 978-0-07-337604-2
* Tanenbaum, A. S., 2002, Computer Networks, 4th Ed., Prentice Hall, Upper Saddle River, New Jersey.
* UNIX Network Programming by W. Richard Stevens, Prentice Hall, 1990

**Expected Background:**

Students are expected to be able to program in C or ++, C#, VB, Python or Java. Students who are not fluent in these topics should make up the deficiencies by homework and programming exercises.

**Catalog description**:

In-depth study of theory, design, implementation and performance of computer and communication networks. Current network types, including point-to-point, satellite, packet switch, local area and wide area networks are studied, as well as evolving techniques such as ATM. Provides an introduction to queuing analysis and includes network programming projects.

In addition to this, students will gain practical experience in setting up communication between computers, networking, and network management. Students will also install different peer-to-peer and client-server network software. They will also gain some experience on inter-networking. Students are required to setup servers and conduct experiments. Students are expected to dedicate outside hours to complete lab assignments. Most lab assignments can be completed using virtual machines set up on personal computers.

Grading:

Midterm and Final Exams 60%

Major Project 15%

 Practical portion (labs), programming

 And student assignments 25%

**Course Topics:**

Fundamentals of computer networks; theory, design, implementation and performance analysis of computer networks; network protocols; examples of computer network applications.

**COURSE OBJECTIVES**: Upon conclusion of this course a student will be able to plan and install a TCP/IP protocol stack based local area network, set up switches and routers, and write socket programs for communication.

**Learning outcomes:**

* 1. Compare and contrast the OSI and TCP/IP models.
	2. Given a network problem, create appropriate topology and draw wiring diagrams.
	3. Make cat 5 cables and connect them with switches and make crossover cables where appropriate.
	4. Configure servers, switches and routers.
	5. Create subnets and supernets.
	6. Create routing tables.
	7. Setup static IP address as well as DHCP based addresses.
	8. Setup a DNS and manipulate MX and A records
	9. Setup a wireless network
	10. Install appropriate network security
	11. Write socket programs

**Assignments (lab and programming):**

General instructions about programming: You may choose any of the following languages: C, C++, C#, Java, Visual Basic, Python. If you would like to use another language please talk with me first. I will not give you any assistance with the programming assignments. You are welcome to talk with others in the class to get general ideas and algorithms, but may not view their source codes.

Assignments are due as specified in the Blackboard. Late penalties: 1 day=10%, 2 days=20%, 1 week=30%, 2 weeks=50%, after two weeks I do not accept assignments.

Week 2. Install Virtual Machine

Week 3. Peer to Peer Networking

Week 4. Remote desktop connection

Week 5. Create Domain Controller

Week 6. NetAdmin

Week 7. Configuring a Server

Week 8. Joining the Domain

Week 9. IIS or Apache Configuration

Week 10. Creation of Security groups

Week 11. Granting local Amin rights

Week 12. Packet Analyzer

Week 13. WSUS

Week 14. Server Backup

**General instructions about the Major Project:** I will assign the projects during the second week of class. Each person will complete the major project independently. However, you may get help from the group members you assigned to (you will be assigned a group randomly). Meet with the group members weekly and keep minutes (minutes should reflect who attended the meeting and what was accomplished by each member that week). You will submit these minutes as part of your report. Start working on the project right away as all projects take several weeks to complete. I will give you date for your presentation; it **must** be presented on that day (an individual who is supposed to present is absent that day, an F will be issued for the final grade). Each member of the group will present a portion of the project to save time. Theory should be limited to one ot two powerpoint slides. Rest of the presentation time should be used to show how the project is implemented and used. Create a multiple choice quiz of 5 questions and administer at the end of the presentation. Grade and submit the scores to Dr. Abraham.

Networking Project Due Dates

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| **Project 1: Internetworking with Linux and Windows (Feb 23)**Install Linux and Windows Server in two different computers. Authentication should be through the use of Windows Active Directory. Share files between the two. Samba provides integration between Windows and Linux.  |
| **Project 2: Router setup using CISCO IOS and creating Virtual Local Area Networks. (March 1)**Set up a CISCO router using IOS. There are home-Cisco router that do not come with IOS; please do not use those. Make sure you can browse the internet and share files.  |
| **Project 3: Cyber Security and Forensics (March 22)**Using Backtrack (or similar software) show how forensic analysis is conducted. Using readily available programs in the internet show how a malware can be planted and show how an attacker then can take control of the system. |
| **Project 4: Microsoft System monitoring and management (March 29)**1. Demonstrate Task Manager and show what you can do with each of the tabs (Applications, Processes, Services, Performance, Networking and Users)
2. Demonstrate the use of Regedit and show how you can search and delete items that cause problems.
3. Demonstrate the use of MSconfig and show you can modify each of those.
4. Demonstrate the use of computer management and explain the use of System tools (task scheduler, event viewer – please spend considerable time here, local users and groups and device manager), disk management and services and application management. There may be some overlap with item #1 here.
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| **Project 5: WINDOWS SERVER GROUP POLICY(April 5)**Demonstrate how to administer group policies. Group policy administrative tools include Group Policy Editor for Active Directory and Sysvol, server side snap-ins, Group Policy Management Console, Resultant Set of Policy. Explain these and show examples of using each. Write some group policies for internet search sites, new program installation, etc. and demo them. |
| **Project 6: VIRTUAL PRIVATE NETWORKING and COMMUNICATION SERVERS (April 12)**The main purpose of this project is to connect two or more offices in different cities together under one network. It should also allow people travelling to access the network. Requires two or more VPN routers or servers at different locations. |
| **Project 7: Open for students with special interests. Submit your ideas in writing for consideration** |

**Programming assignments:**

1. Write a Java program to discover the IP address of your machine.

2. Write a program to send a file across Transport Service Access Points (TSAPs) also known as TCP ports or Sockets. Your program can select any non-privileged port (that is, the port number should be greater than 1024).

3. You have a choice for this assignment: Write a server program to make use of threads. Write appropriate client program to test it. OR Write a Java program to open a file on a remote computer and look up records.

**Drop Policy**: A student who requests a drop on or before THE OFFICIAL DAY TO DROP will receive a DR. After that DP or DF will be given based on the academic standing at the time. It is the responsibility of the student to take care of necessary paper work to receive DP, D, or W. All DP/DFs should be handled prior to the official cut off date for dropping.

**Attendance** is required. A student with three or more unexcused absences (20% of the classes) will be given a F.

**Classroom Conduct:** All students are expected to demonstrate professional behavior and use language appropriate for the classroom learning experience. **All cell phones and computers must be turned off during class (unless you are asked turn it on for classroom purposes or you get permission from me before class in case of an impending emergency).**  Cell phones must be entirely out of sight inside a closed backpack or purse. **IF YOU USE THE PHONE DURING CLASS, I WILL ASK YOU TO BRING THE PHONE TO THE FRONT AND KEEP IT ON THE TABLE UNTIL THE CLASS IS OVER, NO EXCEPTIONS.**

STUDENTS WITH DISABILITIES: If you have a documented disability (physical, psychological, learning, or other disability which affects your academic performance) and would like to receive academic accommodations, please inform your instructor and contact Student Accessibility Services to schedule an appointment to initiate services. It is recommended that you schedule an appointment with Student Accessibility Services before classes start. However, accommodations can be provided at any time. **Brownsville Campus**: Student Accessibility Services is located in Cortez Hall Room 129 and can be contacted by phone at (956) 882-7374 (Voice) or via email at accessibility@utrgv.edu. **Edinburg Campus:** Student Accessibility Services is located in 108 University Center and can be contacted by phone at (956) 665-7005 (Voice), (956) 665-3840 (Fax), or via email at accessibility@utrgv.edu.

MANDATORY COURSE EVALUATION PERIOD: Students are required to complete an ONLINE evaluation of this course, accessed through your UTRGV account (<http://my.utrgv.edu>); you will be contacted through email with further instructions. Online evaluations will be available Nov. 18 – Dec. 9, 2015. Students who complete their evaluations will have priority access to their grades.

SCHOLASTIC INTEGRITY: As members of a community dedicated to Honesty, Integrity and Respect, students are reminded that those who engage in scholastic dishonesty are subject to disciplinary penalties, including the possibility of failure in the course and expulsion from the University. Scholastic dishonesty includes but is not limited to: cheating, plagiarism, and collusion; submission for credit of any work or materials that are attributable in whole or in part to another person; taking an examination for another person; any act designed to give unfair advantage to a student; or the attempt to commit such acts. Since scholastic dishonesty harms the individual, all students and the integrity of the University, policies on scholastic dishonesty will be strictly enforced (Board of Regents Rules and Regulations and UTRGV Academic Integrity Guidelines). All scholastic dishonesty incidents will be reported to the Dean of Students.

SEXUAL HARASSMENT, DISCRIMINATION, and VIOLENCE: In accordance with UT System regulations, your instructor is a “responsible employee” for reporting purposes under Title IX regulations and so must report any instance, occurring during a student’s time in college, of sexual assault, stalking, dating violence, domestic violence, or sexual harassment about which she/he becomes aware during this course through writing, discussion, or personal disclosure. More information can be found at [www.utrgv.edu/equity](http://www.utrgv.edu/equity), including confidential resources available on campus. The faculty and staff of UTRGV actively strive to provide a learning, working, and living environment that promotes personal integrity, civility, and mutual respect in an environment free from sexual misconduct and discrimination.

COURSE DROPS: According to UTRGV policy, students may drop any class without penalty earning a grade of DR until the official drop date. Following that date, students must be assigned a letter grade and can no longer drop the class. Students considering dropping the class should be aware of the “3-peat rule” and the “6-drop” rule so they can recognize how dropped classes may affect their academic success. The 6-drop rule refers to Texas law that dictates that undergraduate students may not drop more than six courses during their undergraduate career. Courses dropped at other Texas public higher education institutions will count toward the six-course drop limit. The 3-peat rule refers to additional fees charged to students who take the same class for the third time.