TCOM 535 Section 1
TCP/IP Suite - Internet Protocols

George Mason University
Fall 2022

ANNOUNCEMENTS

Welcome to TCOM 535!

FIRST CLASS MEETING and LOCATION

First Class: August 28, 2020
Last Class: December 11, 2020
Meeting Day: Friday
Meeting Times: 04:30-07:10 PM
Meeting Room: Angel Cabrera Global Center, Room 1306B

INSTRUCTOR/TA INFORMATION

Instructor: Scott Tran
E-mail: stran4@gmu.edu
Office Hours: Available based on student's needs, and by appointment only.

TA INFO & OFFICE HOURS

Name: TBD
E-mail: TBD

Office hours: TBD
Location: TBD

COURSE DESCRIPTION

TCP/IP is a very large protocol suite, and one of the most important set of protocols in networking today. Since it is too large to squeeze into one semester, we will cover the most relevant topics selected from our book. These topics are chosen with particular emphasis on providing a thorough high-level understanding of this complex protocol suite and other practical issues and implementations concerning TCP/IP today.

Specific technical topics covered: This course studies the Internet Protocol suite by building upon the LAN (TCOM 501) and WAN (TCOM 502) courses. It covers the basic principles and architecture of the Internet and then presents the IP protocol in-depth. It discusses routing algorithms. It provides a detailed treatment of TCP and UDP and traffic characteristics. It explores addressing and naming methodologies used by the industry. The course covers networking applications and their specific application protocols (ARP, ICMP, NAT, RIP, OSPF, IS-IS), and also the management protocol (SNMP). Selected advanced topics on current and evolving Internet protocols, in particular IP multicasting, IP security protocols and services (MPLS, IPSec, etc). Where possible, implementation and practical uses of these protocols will be discussed.

REQUIRED TEXT AND READINGS

Internetworking With TCP/IP Volume 1: *Principles Protocols, and Architecture, 5th edition, 2006, by Douglas E. Comer*
ISBN 0-13-187671-6

Supplemental Readings: Relevant standards documents and articles as determined

COURSE GRADE COMPOSITION and REQUIRMENTS

Attendance: 10%

IP: **Mid-term –** 25%
Quizes – 25%

TCP: **Take-home exam –** 20%
Final – 20% (Comprehensive)

Weightings may be adjusted slightly at instructor's discretion.

Homework assignments may consist of some questions from the text, some questions I hand out, and other tasks the instructor designates.

SCHEDULE/SYLLABUS/TOPICS/LECTURE NOTES

Schedule and syllabus will be adjusted according to topics of interest.

Week – Date	Topics
1 – 26 Aug	Introduction to Internet and its historical overview, the TCP/IP and OSI models, Layering/Encapsulation IP Checksum Tutorials: **http://netfor2.com/checksum.html;** http://en.wikipedia.org/wiki/Signed_number_representations Link Layer, IP Addressing (CIDR), Subnetting **IP Addressing Tutorial:** http://www.bradreese.com/3com-ip-addressing.pdf **CIDR Tutorials:** http://www.ralphb.net/IPSubnet/index.html
2 - 02 Sept	Link Layer, IP Addressing (CIDR), Subnetting **IP Addressing Tutorial:** http://www.bradreese.com/3com-ip-addressing.pdf **CIDR Tutorials:** **http://www.ralphb.net/IPSubnet/index.html**
3 - 09 Sept	ARP, RARP ICMP protocols: packet format and inter-workings **ARP Tutorials:** **http://arpfaq.blogspot.com/** **http://www.comptechdoc.org/independent/networking/guide/netarp.html** **ARP Security Vulnerabilities:** **http://www.watchguard.com/infocenter/editorial/135324.asp**
4 - 16 Sept	**ICMP protocols: packet format and inter-workings: Ping, Traceroute, MTU Size Determination, Port Unreacheability, Security Issues.** **Network Address Translation (NAT): principles and deployment strategies.** **Tutorial on ICMP and Its Associated Security Vulnerabilities:** http://www.sans.org/security-resources/idfaq/icmp_misuse.php
5 – 23 Sept	**IP – Midterm**
6 - 30 Sept	**Routing Protocols (part 1).** RIP Protocol Packet format and internal workings. **RIP Tutorial:** **http://www.ba-stuttgart.de/~schulte/htme/55024.htm#REF24371**
7 – 07 Oct	**Quiz #2 (30 minutes) – RIP** **Routing Protocols (part 2).** Link-State Routing Protocols (OSPF): packet format, functionality and features, pr and design criteria; Dijkstra's algorithm and demo. **OSPF Tutorial**: **http://www.cisco.com/en/US/tech/tk365/technologies_q_and_a_item09186a0080094704.sh**
8 – 14 Oct	**Quiz #3 (30 minutes) – OSPF** **Advanced Topic: Internet Security**-IP security techniques/protocols such as IPSec, SSL. The protocol formats applications**.** IPSec tutorial: http://unixwiz.net/techtips/iguide-ipsec.html
9 - 21 Oct	**Quiz #4 (30 minutes) – IPSec** **TCP Performance:** TCP tuning and performance parameters such as Window size, Karn's algorithm, TCP cong behavior and strategies.

	Tutorial on TCP Performance **http://www.cisco.com/web/about/ac123/ac147/ac174/ac196/about_cisco_ipj_archive_article09186a00800c8**
10 - 28 Oct	**TCP Performance:** TCP tuning and performance parameters such as Window size, Karn's algorithm, TCP cong behavior and strategies. **Tutorial on TCP Performance** **http://www.cisco.com/web/about/ac123/ac147/ac174/ac196/about_cisco_ipj_archive_article09186a00800c8**
11 – 04 Nov	**TCP Performance:** TCP tuning and performance parameters such as Window size, Karn's algorithm, TCP cong behavior and strategies. **Tutorial on TCP Performance** **http://www.cisco.com/web/about/ac123/ac147/ac174/ac196/about_cisco_ipj_archive_article09186a00800c8**
12 – 11 Nov	**TCP Performance:** TCP tuning and performance parameters such as Window size, Karn's algorithm, TCP cong behavior and strategies. **Tutorial on TCP Performance** **http://www.cisco.com/web/about/ac123/ac147/ac174/ac196/about_cisco_ipj_archive_article09186a00800c8**
13 – 18 Nov	**TCP Performance:** TCP tuning and performance parameters such as Window size, Karn's algorithm, TCP cong **Tutorial on TCP Performance** **http://www.cisco.com/web/about/ac123/ac147/ac174/ac196/about_cisco_ipj_archive_article09186a00800c8** **Take-home Exam (paper submission due 02 Dec)**
14 – 25 Nov	**Thanksgiving recess -No class**
15 – 02 Dec	**TCP Performance:** TCP tuning and performance parameters such as Window size, Karn's algorithm, TCP cong **Tutorial on TCP Performance** **http://www.cisco.com/web/about/ac123/ac147/ac174/ac196/about_cisco_ipj_archive_article09186a00800c8**
16 – 09 Dec	**TCP Performance:** TCP tuning and performance parameters such as Window size, Karn's algorithm, TCP cong behavior and strategies. **Tutorial on TCP Performance** http://www.cisco.com/web/about/ac123/ac147/ac174/ac196/about_cisco_ipj_archive_article09186a00800c8417
16 – 14 Dec (Make-up Class)	TCP Final Exam (Comprehensive).

This schedule is tentative. We will not cover the entire textbook. Coverage of topics may be adjusted slightly in response to questions on topics, progress, and instructor's discretion.