CSCI 445 Computer Communications Networks

Department of Engineering and Computer Science
Virginia State University, Petersburg, Virginia

Fall 2016

Instructor	Hui Chen, Ph.D.	Office Phone	(804)524-5428
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Office Hours	08:00 – 10:00 Monday 08:00 – 09:00 Wednesday 08:00 – 10:00 Friday 11:00 – 12:00 Friday and by appointment		

Class Meeting and Location

5:00 – 6:30PM Monday and Wednesday, August 15 – December 5, 2016 HM 14S

Catalog Description

ISO model for communications. Protocols for physical, data link and network communications. Sockets. TCP/IP. Applications. Protocol correctness and efficiency. Error detection and recovery. Local-area and Wide-area networks.
Prerequisites: CSCI 250 Programming in C++ II; CSCI 250 Programming in C++ II Lab

Textbook

1. Larry L. Peterson and Bruce S. Davie, Computer Networks: A Systems Approach, 5th Ed., Morgan Kaufmann, 2011. ISBN-10: 0123850592. ISBN-13: 978-0123850591.

Additional Reading

2. Andrew S. Tanenbaum, Computer Networks, 5th Ed. Prentice Hall PTR, Saddle River, New Jersey 07458, USA, 2010, ISBN-10: 0132126958, ISBN-13: 978-0132126953.

3. James F. Kurose and Keith W. Ross, Computer Networking: A Top-Down Approach, 5th Ed., Addison Wesley, 2009, ISBN: 0-13-607967-9

Major Topics

I. Introduction to computer communications foundation (1 week or 3 hours)

   a. Brief history of computer communications

   b. Signals and modes of transmission

   c. Layer and protocols

d. Internet architecture
e. Bandwidth and latency
f. Classes of applications and applications performance needs

II. Links and simple networking (2 weeks or 6 hours)

a. Classes of links and physical media
b. Encoding
c. Framing
d. Error detection and correction
e. Link layer protocols: services and functions
f. Case study: Ethernet and multiple access networks (IEEE 802.3)
g. Case study: wireless LANs (IEEE 802.11/Wi-Fi)
h. Case study: Bluetooth (IEEE 802.15.1)
i. Case study: Cell phone technologies

III. Internetworking (2 weeks or 6 hours)

a. Switching and bridging
b. Basic Internetworking (IPv4)
c. Routing
d. Implementation and performance

IV. Advanced Internetworking (1.5 weeks or 4.5 hours)

a. Routing Areas
b. Interdomain routing
c. IPv6

V. End-to-End Protocols (1.5 weeks or 4.5 hours)

a. Simple demultiplexer (UDP)
b. Reliable byte stream (TCP)
c. Remote procedure call
d. Transport for real-time applications (RTP)

VI. Congestion control and resource allocation (1 week or 3 hours)

a. TCP congestion control
b. Congestion-avoidance mechanism

VII. Network security (2 weeks or 6 hours)

a. Transmission, emission, and security
b. Cryptographic building blocks
c. Key management

d. Authentication protocols

e. Example systems: PGP, SSH, TLS, SSL, HPPTS, IPsec, 802.11i

VIII. Applications (2 weeks or 6 hours)

a. E-mail (SMTP, MIME, and IMAP)

b. HTTP

c. Web services

d. DNS

e. SNMP

Course Learning Outcomes

Students are expected to be able to:

1. Have knowledge of OSI 7-layer reference model and be able to use it in learning, analysis, and design network protocols;
2. Be able to explain different network design alternatives with simple quantitative or qualitative analysis of their network performance;
3. Have knowledge of switched networks, routing algorithms, and transport layer protocols and can apply the knowledge to application design, development, or analysis;
4. Have knowledge of TCP/IP network suite and can apply the knowledge to configuration and setup of practical networks for home or office use; and
5. Gain ability to understand basic computer network algorithms, protocols, and technology independently and thus enable them to pursue continuous development in computer networking, such as graduate study specializing in computer network research and network engineers in a technical company.

Class Participation

Students' attendance and active class participation are expected and required. Students are also expected to maintain appropriate affect and demeanor.

Disability Services

The Americans with Disability Act (ADA) is intended to insure that students have equal access to the campus and course materials. The instructor will work with the students with Disabilities program to provide reasonable accommodation to students with disabilities. Please contact the Office of Disable Students Services at (804)524-5061.

Access to Course Material and Grades

The instructor uses Blackboard (`http://blackboard.vsu.edu` to post students' grades on exams, quizzes, in-class exercise, laboratory exercise, and projects.

The instructor maintains a class website to disseminate course lecture nodes, exercises, projects, and other course related material. The website is at `http://huichen-cs.github.io/course/CSCI445`.

The University use the Banner system to post midterm and final grades.

The instructor advises that students check often Blackboard, the class website and Banner for any class updates and their performance in the class.

Grading

The evaluation is based a few components listed as follows,

Component	Percentage
Midterm Exam	25%
Final Exam	25%
Attendance	5%
Quizzes and In-Class Exercises	15%
Laboratory and Homework	15%
Projects	15%
Total	100%

Note that

- Both examinations are cumulative and given in a varied format;
- There will be multiple projects. Some projects are individual project and some are group projects. A project may require written report, oral presentation, and in-class or out-of-class demonstrations.
- Quizzes are unannounced individual work.
- The instructor may merge some components the above into one when calculating midterm and final grades

Your final letter grade will be given as follows according to the percentage,

Percentage	Grade
90-100%	A
80-89%	B
70-79%	C
60-69%	D
0-59%	F

Certification

The instructor encourages students to acquire the following certifications

- CompTIA Network+ certification
- CompTIA Security+ certification
- Cisco Certified Network Associate

Important Dates

Monday, Aug. 15	University classes begin
Friday, Aug. 19	Last Day to Add/Drop classes
Monday, Sep. 5	Labor Day Holiday
Monday Sep. 26 – Friday Sep. 30	Midterm Exam
Monday Oct. 3 – Tuesday Oct. 4	Fall Break
Friday, Nov. 21	Last Day to Withdraw from classes
Wednesday, Nov. 23 – Sunday, Nov. 27	Thanksgiving Holiday
Monday, Nov. 28	Last day of classes
Tuesday, Nov. 29	Reading day
Friday, Nov. 30 – Monday, Dec. 5	Final Exam

Disclaimer

The instructor reserves the right to revise this syllabus.