
USM COS 460 Computer Networks (Fall 2021)

COS 460 Lecture Notes Projects Syllabus

Syllabus

USM Course Catalog: *A description of computer networks organized as a layered architecture based on the OSI Reference Model. Protocols and services of each layer are examined in detail. Specific local area networks, metropolitan area networks, and wide area networks will be considered. Prerequisites: COS 285, COS 251. Cr 3.*

The focus of the course will be on understanding and utilizing the Internet (TCP/IP) protocol stack. Students will write network client and server applications in addition to reading and discussing the theory behind modern data communication networks.

The class is often dual-listed as an undergraduate (COS 460) and graduate course (COS 540); graduate students will have additional reading and must prepare a presentation for the class (see below).

Instructor

Stephen Houser houser@maine.edu

Course Objectives

The objectives of the course are as follows.

- The layering scheme of network protocols and how layers are implemented.
- The options available at each layer of the network and protocols used.
- How local networks work and how they interconnect to form inter-networks

and the Internet.

- How application layer protocols are developed and used in practice. Including but not limited to:
 - DNS - Domain Name Service
 - DHCP - Dynamic Host Configuration Protocol
 - HTTP - Hyper Text Transfer Protocol
 - SMTP - Simple Mail Transport Protocol
- How develop network server and client applications.

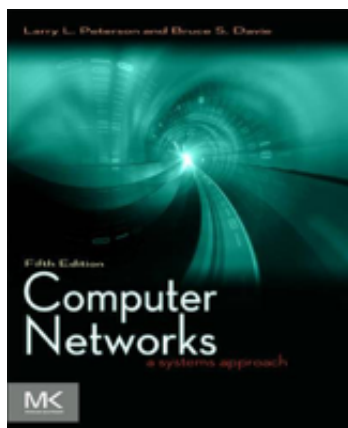
Prerequisites and Expectations

- COS 285
- COS 251

The course involves a fair amount of independent learning, experimentation, and work. Internet resources on network programming are plentiful and class time is limited. You will be expected to read (or at least skim and absorb) enough of these materials to be prepared for class.

Textbook

You will use the textbook in and out of class. The examinations will combine material from in-class discussion and the textbook. The textbook is the reference for the course. All textbook material may not be covered during in-class discussions, yet you will still be responsible to demonstrate an understanding of it on the examinations.



Computer Networks: A Systems Approach, Fifth Edition, L. L. Peterson and B. S. Davie, Morgan Kaufmann, 2011.

Amazon.com lists this textbook as *Computer Networks, Fifth Edition: A Systems Approach (The Morgan Kaufmann Series in Networking) (Hardcover)* for \$56.24.

The Publisher maintains a site for the book and book extras at <http://booksite.elsevier.com/9780123850591/>

This book is FREELY and legally available online at
<https://book.systemsapproach.org>

Projects

The course is partially project-based. There will be four (4) programming projects throughout the course. The projects will require you to develop network client and server programs. They will be graded both on how they work and how they are constructed and documented. You can use most any modern programming language (Java, C, C++, or python). If you intend on using something out of the ordinary – not used in the curriculum – please contact the instructor prior to beginning for approval.

Schedule of Projects

n	Project	Possible Points
1	Number Guess	50
2	HTTP Server	100
3	TBA Part 1	75
4	TBA Part 2	100

Your code will be submitted (checked in) on [GitHub](#) to an assignment for each

project. Details on what needs to be submitted will be included with each assignment. In all cases, you should submit only source code, no binary executable files.

Your code must compile and run on systems other than your own, specifically the CS Cluster and/or the instructor's system. Be diligent not to include absolute paths or other common mistakes that prevent your code being compiled and executed on other systems.

Code should work and be your own creation. There are numerous sources of information on the Internet, including code. However, your submissions should be your own work not that of others cut-and-pasted into your projects or that of your classmates. Plagiarism is a serious offence and will be treated accordingly.

Project Grading Rubric

Score	Grade	Notes
90-100%	A	Compiles, runs, meets or exceeds all specifications, well documented and organized
80-89%	B	Compiles, runs, meets most or all specifications (black box tests)
60-79%	C	Compiles, runs, meets some specifications
50-59%	D	Does not compile or run, does not meet specifications
0-50%	F	Not submitted, poor work

Examinations

The course includes three (3) examinations. The examinations will cover all the material since the last examination. The final examination will primarily cover the material since the prior examination but also include some material from the entire course.

Schedule of Examinations

Exam	Possible Points	Notes
1	100	
2	100	
3	125	Cumulative

The questions on the examinations will be a combination of material in the assigned sections of the book and what is discussed in class. The questions at the end of each chapter in the book are an excellent reference for what to expect on the examination questions.

The examinations will be conducted within Blackboard (www.courses.maine.edu). Each exam will be available to you on the day of the exam and require you to complete all the questions within a specific time duration (typically the same as the class meeting duration). Examinations will be automatically graded and your results immediately available for all non-essay answers.

Exam Grading Rubric

Score	Grade
90-100%	A
80-89%	B

60-79%	C
50-59%	D
0-50%	F

Research Summary Paper and Presentation (COS 540 Only)

The graduate course includes writing a research summary paper and presentation of the material to the class. The presentations will be approximately 30 minutes in length.

The schedule of presentations is available via [Google Calendar when available] with your University UserID. Presentation slots will begin the second week of class and end the week before final exams. They will be self-assigned, first-come first-choice.

Schedule of Graduate Work

Assignment	Possible Points
Paper	50
Presentation	50

Schedule

The following is the general schedule for the course. Topic coverage and due dates change based on progress, snow-days, holidays, and other events. Please see the [Course Summary](#) for current dates, topics, and reading materials.

Date	Topic	Notes/Reading
Week 1	Course Overview and Foundation, Socket Programming	Ch. 1 - Sections 1.1 - 1.4 and, A Brief History of the Internet , There and Back Again: A Packet's Tale (video) , Beej's Guide to Network Programming (C) , The Java Tutorial: All About Sockets , Python Network Programming
Week 2	Network Performance	Ch. 1 - Sections 1.5 and 1.6, Getting Connected
Week 3	Local Links and Encoding, More Socket Programming	Ch. 2 - Sections 2.1 - 2.5, Assignment #1 Due
Week 4	Ethernet and Wireless	Ch. 2 - Sections 2.6 - 2.8
Week 5	Switching and Bridging	Ch. 3 - Section 3.1, Exam #1 (Online)
Week 6	Basic Internetworking (IP)	Ch 3. - Section 3.2, Bootstrapping with BOOTP and DHCP , Assignment #2 Due
Week 7	Routing	Ch. 3 - Section 3.3 and 3.5
Week 8	Simple Demultiplexer (UDP), Reliable Byte Stream (TCP)	Ch. 5 - Section 5.1 and 5.2
	Remote	

Week 9	Procedure Call (RPC), Real Time Protocol (RTP)	Ch. 5 - Section 5.3 - 5.5
Week 10	Congestion Control	Ch 6. - Sections 6.1, 6.3, 6.5, and 6.6, Exam #2 (Online)
Week 11	Presentation Formatting	Ch. 7 - Section 7.1, Assignment #3 Due
Week 12	Multimedia Data	Ch. 7 - Sections 7.2 - 7.3, YouTube network traffic at a campus network
Week 13	Network Security	Ch. 8 - Sections 8.1, 8.4, 8.5, 8.6, A Look Inside Network Address Translators and Virtual Local Area Networks (VLANs)
Week 14	Traditional Applications, Overlay Networks	Ch. 9 - Sections 9.1, 9.5, The Internet Under Crisis Conditions: Learning from September 11 , An analysis of the Skype peer-to-peer Internet telephony protocol
Week 15	Graduate Presentations	Final Exam (online), Graduate Presentations Due, Graduate Research Papers Due, Assignment #4 Due

Grades

Grades for the course will be based on an accumulation of points from the examinations and assignments. Schedule of Point Accumulation and Grade Assignment

COS 460	COS 540	% Score	Grade

585 - 650	675 - 750	90-100%	A
520 - 584	600 - 674	80-89%	B
390 - 519	450 - 599	60-79%	C
325 - 389	375 - 449	50-59%	D
0 - 324	0 - 374	0-50%	F

Late Policy


Extensions on projects, presentations, and examinations will not be granted except in the case of an emergency. Technical difficulties do not constitute an emergency. Late submissions will be penalized. Lateness will be determined by submission time and the assigned due date.

Accommodations and Inclement Weather

Should you need services or accommodations due to a disability to fully participate in the class, please speak with the instructor or contact the Office of Academic Support for Students With Disabilities, Luther Bonney 242 on the Portland Campus.

Class cancellations are posted on USM's website (<http://usm.maine.edu>) and on the Storm Line at 780-4800. You can also receive cancellations and emergency information from the USM Alert text messaging system (<http://usm.maine.edu/usmalert>).

Stephen Houser
houser@maine.edu

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University of Southern Maine,
Computer Science