

Internetworking and Distributed Systems Laboratory

Instructor: [Prof. Young H. Cho](#)

T.A.: TBD

Course Syllabus

This class covers Internetworking technology and distributed systems. It focuses on practical systems design, performance evaluation, monitoring and diagnosis. The students will gain hands-on experience on actual systems while learning the skills necessary to conduct new research in the field.

Lectures: Following is the schedule of lectures for the course

Week	Tuesday	Thursday
1	Aug 22 - Introduction	Aug 24 - Networking
2	Aug 29 - Computer Networking and Ethernet	Aug 31 - Internet Protocol
3	Sep 5 - Transport Layer	Sep 7 - Network Performance Measurements
4	Sep 12 - Routing in Internet	Sep 13 - Details of Internet Protocol
5	Sep 19 - IP Address, ARP, and ICMP	Sep 21 - Programmable Network Interface
6	Sep 26 - Hardware Accelerated Networking	Sep 28- NetFPGA Overview
7	Oct 3 - Software Defined Networks	Oct 5 - Virtualization and OpenFlow
8	Oct 10 - OpenFlow on NetFPGA	Oct 12 - Wireless Sensor Network (Part I)
9	Oct 17 - Wireless Sensor Network (Part II)	Oct 19 - Multiprocessors
10	Oct 24 - Distributed Multicomputer	Oct 26 - Network Processors
11	Oct 31 - Networking for Distributed Systems (Part I)	Nov 2 - Networking for Distributed Systems (Part II)
12	Nov 7 - Distributed Bioinformatic System	Nov 9 - TBD
13	Nov 14 - Presentation Practice Run	Nov 16 - Presentation Practice Run
14	Nov 21 - The Final Lecture	Nov 23 - Thanksgiving
15	Nov 28 - Final Project Presentations	Nov 30 - Final Project Presentations
16	Dec 8 to Dec 15 - Final Project Demo	

Reading List: During the first half of the course. There will be 1 reading assignment per week designed to give you basic knowledge in the field. In the beginning of the following week, each student must submit a 3-4 page powerpoint slide presentation that succinctly summarizes the paper (relevant figures, animations, with few words that effectively describes the content). On the last page, you are to devise 1 exam question and answer on the paper.

No	Papers	Due Date
1	Leiner, B., et al., " The DARPA Internet Protocol Suite ", INFOCOM 85, Washington, D. C., March 1985.	Aug 28 at 11:55pm
2	Narten, T., " Internet Routing ", ACM SigCom 89.	Sep 4 at 11:55pm
3	Gerla, M. et al, " Generalized Window Advertising for TCP Congestion Control ", UCLA Tech Report, Feb 1999.	Sep 11 at 11:55pm
4	White, L. et al, " An Integrated Experimental Environment for Distributed Systems and Networks ", OSDI 2002, December 2002.	Sep 18 at 11:55pm
5	DETER team, " Cyber defense technology networking and evaluation ", In Communications of the ACM, Special issue on Emerging Technologies for Homeland Security, Vol. 47, Issue 3, pp 58-61, March 2004.	Sep 25 at 11:55pm
6	Watson, G., " NetFPGA: A Tool for Network Research and Education ", 2nd Workshop on Architecture Research using FPGA Platforms (WARFP) February, 2006.	Oct 2 at 11:55pm

7	Seitz, C. et al, " Myrinet: A gigabit-per-second local area network ", IEEE MICRO Feb 1995.	Oct 12 at 11:55pm
8	Moscola, J. et al., " Reconfigurable Content-based Router Using Hardware-Accelerated Language Parser ", ACM Transaction on Design Automation of Electronic Systems on Demonstrable Software Systems and Hardware Platforms, Volume 13, Number 2, April 2008.	Oct 19 at 11:55pm
9	McKeown, N. et al, " OpenFlow: enabling innovation in campus networks ", ACM SIGCOMM Computer Communication Review, vol. 38, New York, NY, April 2008.	Oct 26 at 11:55pm
10	TBD	Nov 2 at 11:55pm

Team: You are to form teams of 3 students. The teams will compete against another team in the class then graded accordingly.

Project: All of the group labs are competitive. There will be a final project report of a conference paper format (IEEE or ACM conference format; double columns, 6+ pages). Additional details will be given as the course progresses.

No	Tasks	Due Date
1	Get individual DETER account and Moodle account	Aug 22 at 11:55pm
2	Laboratory 1a: (Individual): "Getting Started" Emulab Tutorial on DETER	Aug 24 at 11:55pm
3	Laboratory 1b: (Individual): Advanced Tutorial on DETER	Aug 24 at 11:55pm
4	Establish project team of 3 students - post on under Project Groups	Aug 26 at 11:55pm
5	Laboratory 2: (Individual): Linux Socket Programming Tutorial	Aug 26 at 11:55pm
6	Laboratory 3: (Individual): Virtual machines	Aug 30 at 11:55pm
7	Laboratory 4: (Individual): Network performance measurement and tuning	Sep 2 at 11:55pm
8	Laboratory 5: (Group): Fast and Reliable File Transfer Protocol	Sep 11 at 11:55pm
9	Laboratory 6: (Individual) Quagga Router	Sep 16 at 11:55pm
10	Laboratory 7: (Group) Software IP router	Sep 25 at 11:55pm
11	Laboratory 8: (Group) Fast and Reliable File Transfer using TCP/IP	Oct 9 at 11:55pm
12	Laboratory 9: (Group) Open Flow Switch on DETER	Oct 14 at 11:55pm
13	Final Project Proposal	Oct 16 at 11:55pm
14	Final Project Checkpoint (Mondays during T.A.'s Office Hour)	TA office hour
15	Final project presentation slides	Nov 27 at 11:55pm
16	Final project report	Dec 13 at 11:55pm

Final Project Presentation: There will be a 10 minute final slide presentation and 5 minute Q&A session for each project group. All students will be required to participate and attend.

Final Project Report: The final project report is due on **the Final Demo (Dec 6-13) time**.

Exams: There are no mid-term and final exams.

Prerequisite: CS402 and EE450; Recommended preparation: CS551

If you did not take CS402 or EE450 at USC, look at here for [placement exam requirements](#).

Limited space: Due to limited space and equipment in the laboratory, the class can only accommodate a small number of students (less than 30). If you have a strong interest to the class, prepare to register early. If you are on the waiting list, the CS Department will give out D-clearance according to the order on the list.

Grading

Quizzes and Attendance	30%
Reading and Tutorials (Labs 1-2)	10%
Laboratories (Rest of the Labs)	25%
Final Presentation	10%
Final Project Demo	25%

Letter grade conversion

98% - 100+%	A+
90% - 98%	A
85% - 89%	A-
82% - 84%	B+
78% - 81%	B
75% - 77%	B-
60% - 74%	C
50% - 59%	D
00% - 49%	Fail

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