EE 450 – Introduction to Computer Networks
Units: 4
Term—Day—Time:  TTh 2 to 3:50 PM Lectures  
Location: THH 210

Discussion: Friday 11 to 11:50 AM  
Location: SOS B46

Instructor: Prof. Cauligi Raghavendra  
Office: EEB 216  
Office Hours: TTh 4 to 5:30 PM

Contact Info: raghu@usc.edu, (213) 740-9133

Catalogue Course Description
Network architectures; layered protocols, network service interface; local, wide area, wireless networks;  
Internet protocols; link protocols; addressing; routing; flow control; software defined network; multimedia  
networks.

Learning Objectives
Students will learn fundamentals of computer networks, main protocols and applications of the Internet,  
design and analysis of networks, and use of software tools for understanding workings of the Internet.  
Writing socket programming to learn about protocols and applications and use simulation and emulation  
for performance evaluation.

Registration Restriction: Open only to junior standing and above  
Crosslisted as CSCI 450

Technological Proficiency and Hardware/Software Required
Students are required to have basic familiarity of programming and elementary probability theory.

Required Readings and Supplementary Materials
Pearson Publishers.  
Supplementary materials are tutorial notes on Unix, C, C++, and Mininet user guides.

Description and Assessment of Assignments
This course is based on established materials from a widely used textbook. There will be weekly homeworks  
with problems on materials covered in class, programming projects (see below for examples), network  
simulations on simulation platforms like OPNET and NS-3, and lab exercises in the discussion period. Sample  
programming projects include:

Programming Assignment #1: Error Detection Algorithm
In this Programming assignment, students are required to implement an error detection mechanism  
discussed in class. This scheme is used in the DLC/MAC layers to detect any possible errors in the received  
frame. Recommended language C/C++ or Python.

Programming Assignment 2: The Dijkstra Least-cost Path Algorithm
In this assignment, students are asked to write a Program that computes the shortest spanning tree between  
a given node (the root) and every other node in the network. Recommended language C/C++ or Python.
**Term Programming Project: Network Socket Programming:** The objective of this assignment is to familiarize students with UNIX socket programming. The Project consists of 3 parts. The **first part** involves creating a server in C/C++ or Python. The **second part** requires the creation of a UDP client (communicating with a server using Datagram sockets) and a TCP client (communicating with a server using Stream sockets) and the **third part** will be to create a multi-threaded proxy web server capable of supporting multiple requests at the same time.

**Grading Breakdown**

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<tr>
<th>Assignment</th>
<th>Points</th>
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<tbody>
<tr>
<td>Home Works</td>
<td>5</td>
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<tr>
<td>Programming Projects</td>
<td>15</td>
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<tr>
<td>Quizzes</td>
<td>10</td>
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<tr>
<td>Mid Term Exam</td>
<td>30</td>
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<tr>
<td>Final Exam</td>
<td>40</td>
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<tr>
<td>TOTAL</td>
<td>100</td>
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**Assignment Submission Policy**

Assignments are assigned weekly and due in class the following week. Programming projects and mininet exercises are explained and assigned in discussion section.

**Course Schedule: A Weekly Breakdown**

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<tr>
<th>Week 1 Dates</th>
<th>Topics/Daily Activities</th>
<th>Readings</th>
<th>Homework Deliverable/ Due Dates</th>
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<tbody>
<tr>
<td></td>
<td>Introduction and overview of course Network elements, Internet, Protocols, Physical media</td>
<td>Chapter 1</td>
<td>Home Work 1</td>
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<tr>
<td>Week 2 Dates</td>
<td>Packet and message switching; performance, metrics; protocol layers; Link Layer</td>
<td>Chapter 1</td>
<td>Home Work 2 Quiz 1</td>
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<tr>
<td>Week 3 Dates</td>
<td>Error Detection and Correction; Ethernet</td>
<td>Chapter 6</td>
<td>Home Work 3 Quiz 2 Programming project #1 assigned</td>
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<tr>
<td>Week 4 Dates</td>
<td>Multiple Access protocols, CSMA/CD, Data Centers</td>
<td>Chapter 6</td>
<td>Home Work 4 Quiz 3</td>
</tr>
<tr>
<td>Week 5 Dates</td>
<td>Applications, Web and HTTP, e-mail, SMTP</td>
<td>Chapter 2</td>
<td>Programming Project #1 Due Term programming project part 1 assigned</td>
</tr>
<tr>
<td>Week 6 Dates</td>
<td>DNS, HTTP, P2P applications,</td>
<td>Chapter 2</td>
<td>Home Work 5 Quiz 4</td>
</tr>
<tr>
<td>Week 7 Dates</td>
<td>Transport Layer Protocols; TCP and UDP</td>
<td>Chapter 3</td>
<td>Home Work 6</td>
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Statement on Academic Conduct and Support Systems

Academic Conduct
Plagiarism – presenting someone else's ideas as your own, either verbatim or recast in your own words – is a serious academic offense with serious consequences. Please familiarize yourself with the discussion of plagiarism in SCampus in Section 11, Behavior Violating University Standards https://scampus.usc.edu/1100-behavior-violating-university-standards-and-appropriate-sanctions. Other forms of academic dishonesty are equally unacceptable. See additional information in SCampus and university policies on scientific misconduct, http://policy.usc.edu/scientific-misconduct.

Discrimination, sexual assault, and harassment are not tolerated by the university. You are encouraged to report any incidents to the Office of Equity and Diversity http://equity.usc.edu or to the Department of Public Safety http://adminopsnet.usc.edu/department/department-public-safety. This is important for the safety of the whole USC community. Another member of the university community – such as a friend, classmate, advisor, or faculty member – can help initiate the report, or can initiate the report on behalf of another person. The Center for Women and Men http://www.usc.edu/student-affairs/cwm/ provides 24/7 confidential support, and the sexual assault resource center webpage http://sarc.usc.edu describes reporting options and other resources.
Support Systems
A number of USC’s schools provide support for students who need help with scholarly writing. Check with your advisor or program staff to find out more. Students whose primary language is not English should check with the American Language Institute http://dornsife.usc.edu/ali, which sponsors courses and workshops specifically for international graduate students. The Office of Disability Services and Programs http://sait.usc.edu/academicsupport/centerprograms/dsp/home_index.html provides certification for students with disabilities and helps arrange the relevant accommodations. If an officially declared emergency makes travel to campus infeasible, USC Emergency Information http://emergency.usc.edu will provide safety and other updates, including ways in which instruction will be continued by means of blackboard, teleconferencing, and other technology.