**CMP 743: Principles of Communications Networks**

4 hours, 4 credits. Digital and analog communication, system architectures, and connection-oriented and connectionless service. The OSI model as a conceptual framework, and actual communication models and their protocols. Selected contemporary topics, such as communications security and the World Wide Web. PREREQ: A course in operating systems.

**Location and Meeting Times: Gillet 231,** M, W 9:00-10:40 am

**Webpage:** on blackboard

**Instructor Information:**

**Name: Jiang Wu**

**Contact:** [jiang.wu1@lehman.cuny.edu](mailto:jiang.wu1@lehman.cuny.edu)

**Office Hours: Gillet 233, M, W 2pm – 4pm**

**Grading Policy**

**Expectations:**Students need to spend at least 6 hours per week, in addition to attending the classes, on reading assigned book chapters and writing lab reports. Lab projects shall be finished on time and independently. A report is expected on each lab based on requirements handed out. Quiz and exam questions will be given on key concepts covered by the lectures and on typical problems experienced during lab projects.

**Homework Assignments and Labs: 25%**

**Programming Assignments: 35%**

**Midterm 20% Final 20%**

**Materials, Resources and Accommodating Disabilities**

**Textbook:**

Computer Networking: A Top-Down Approach (5th Edition) [Hardcover]  
By James F. Kurose and Keith W. Ross  
ISBN-10: 0136079679, ISBN-13: 978-0136079675

**References:**

Douglas E. Comer, “Internetworking with TCP/IP, Volume 1”.

**“**Cisco IOS in A Nutshell”, O’Reilly, ISBN 1-56592-942-x

Wikipedia entries on computer networking topics

**Accommodating Disabilities:**Lehman College is committed to providing access to all programs and curricula to all students.  Students with disabilities who may need classroom accommodations are encouraged to register with the Office of Student Disability Services.  For more info, please contact the Office of Student Disability Services, Shuster Hall, Room 238, phone number, 718-960-8441.

**Attendance Policy (from student handbook)**

Students are expected to attend classes regularly, and instructors are required to record attendance for grading and counseling purposes. Individual instructors, as well as departments or degree programs, may establish specific attendance requirements. Instructors have the right to weigh attendance and class participation in determining grades. It is the student’s responsibility to ascertain the effect attendance may have on the grade in a course. Students receiving financial aid must be certified as attending classes regularly for continuing eligibility.

**Academic Integrity and Plagiarism Policy**

Statement may be found in student handbook. For more information refer to http://www.lehman.cuny.edu/student-affairs/documents/student-handbook-02.pdf.

**Course Objectives**

After successfully completing this course, students should be able to:

1. Define and use basic concepts and terminologies for networking.
2. Describe the layers of the TCP/IP reference model and their purposes.
3. Explain the differences between TCP and UDP.
4. Explain how TCP creates connections, ensures reliable data transmission and does flow control.
5. Write simple network programs using UDP and TCP.
6. Use classless IP addressing to subnet an IP address block.
7. Explain how routers work. Create a network with routers and static routes.
8. Explain the operations of routing protocols such as RIP, OSPF. Configure a network using one or more routing protocols.
9. Explain how LANs, hubs, switches, and wireless LANs work. Explain the concept of VLAN. Create VLANs by configuring switches.
10. Compare the pros and cons of major network design choices such as packet switching vs. circuit switching, FDM vs. TDM.

**Outline**

The following will be covered roughly one topic per lecture, as much as possible.

1. Introduction to Computer Networks and the Internet. Section: 1.1, 1.2, 1.3
2. Performance issues in the Internet. Section 1.4
3. Introduction to the TCP/IP and ISO 7 networking models. Section: 1.6, lab 1.
4. Application Layer Overview. HTTP, FTP. Section: 2.1, 2.2, 2.3
5. SMTP, DNS and Peer to Peer Applications. Section: 2.4, 2.5, 2.6
6. Lab 2. (Wireshark Lab on application layer protocols)
7. Socket Programming with TCP and UDP. Section 2.7, 2.8. Programming Assignment 1.
8. Transport Layer Services overview. Section: 3.1, 3.2
9. UDP and TCP. Section: 3.3, 3.4, 3.5.
10. Lab 3 (Basic network setting and debugging, wireshark lab on TCP)
11. TCP congestion control. Section 3.6, 3.7.
12. Network Layer Introduction. Section 4.1, 4.2, 4.3
13. IP protocol, Subnetting, Section 4.4
14. Lab 4 (Wireshark lab on network layer), Programming assignment 2
15. Routing Algorithms, Section 4.5, 4.6
16. **Midterm**
17. Lab 5 (Network configuration lab on routing)
18. Lab 6 (Subnetting)
19. Link Layer Overview, Section 5.1, 5.2 5.3
20. Ethernet, (MAC address, ARP, CSMA/CD), Section 5.4, 5.5
21. Ethernet Switches, VLAN
22. Lab 7 (Wireshark lab on Ethernet, VLAN configurations)
23. Wireless Networking, Chapter 6
24. Ad-hoc Wireless Networking
25. Lab 8 (Wireshark lab and ad-hoc networking configurations)
26. Network Security Basics, Chapter 8
27. Lab 9, Wireshark lab on security. Programming Assignment 3.
28. **Final Exam (accumulative)**

This syllabus and others are available at: http://comet.lehman.cuny.edu/.

Department of Mathematics and Computer Science, Lehman College, City University of New York