

**Master Course Syllabus**  
School of Engineering and Computer Science  
Washington State University Vancouver

**CS 455**  
**Introduction to Computer Networks**  
3 Semester Hours

**Catalog Description**

Principles and implementation of computer networks; architectures, protocols, internetworking and addressing case studies.

**Prerequisite Courses**

CS 360 – Systems Programming

**Prerequisite Topics**

- Proficiency with the C programming language
- Discrete probability, permutations and combinations
- Mathematical proof techniques
- Basic digital logic
- Use of Unix environment for coding, compilation, debugging and testing
- Use of Unix operating system API, particularly low level I/O and file system access

**Measured Course Outcomes**

Students taking this course will (among other things):

1. Analyzes the design principles and communication protocols in computer network systems (*Contributes to performance criterion A-2*)
2. Design, implement and debug network systems which communicate via TCP/IP using the socket API (*Contributes to performance criterion K-6*)
3. Examines current problems and proposed solutions in the networking area (*Contributes to performance criterion J-2*)

**Required Textbooks**

Computer Networking - a top-down approach featuring the Internet, by James F. Kurose, Keith W. Ross, 3rd Edition, 2005.

**Reference Material**

UNIX Network Programming Volume 1, by W. Richard Stevens, 2<sup>nd</sup> Edition, Prentice Hall, 1998.

Computer Networks, by Andrew S. Tanenbaum, 4<sup>rd</sup> Edition, Prentice Hall, 2003.

### **Major Topics Covered in the Course**

1. Definitions and concepts of computer networks
2. History of networking and the internet
3. Network architectures
4. Lectures and assignments will work down through the protocol stack addressing both idealized and industry standard protocols:
  - i. Physical Layer
  - ii. Data Link Layer (including Medium Access Control sublayer)
  - iii. Network Layer
  - iv. Transport Layer
  - v. Application Layer
5. Socket programming
6. Network security
7. Current issues and emerging technologies related to computer networks

### **Laboratory Projects**

Programming Project Area	Weeks
Network algorithm programming	4
Network system programming	4

### **CSAB Category Content**

	FUNDAMENTAL	ADVANCED		FUNDAMENTAL	ADVANCED
Data Structures	0	0	Computer Organization and Architecture	0	1
Algorithm & Software Design	0	2	Concepts of Programming Languages	0	0

### **Oral and Written Communications**

There are no significant oral or written communications required in this course. Virtually all assignments consist of writing computer programs or solving problems.

### **Social and Ethical Issues**

This course contains approximately 1 hour of coverage of social and ethical issues related to network security, anonymity and data encryption.

### **Theoretical Content**

Topic	Hours
Network Control Algorithms	6
Nyquist Theorem and Shannon-Hartley Law	1

### **Problem Analysis**

Students are given 5-8 non-programming assignments requiring their analysis of bandwidth limitations, protocols, error detection, etc. Students are expected to use or extend example analyses from lectures to find answers to the problems.

For the programming projects, students are usually given requirements for the programs but must perform sufficient analyses of the requirements to arrive at an effective program design.

### **Solution Design**

Solutions to many of the non-programming assignment problems are of a mathematical nature involving proofs or mathematical derivations.

Programming projects require the student to perform substantial design to arrive an implementation that fulfils the functional requirements and is both robust and well organized.

### **CC2001**

This course provides coverage of topics in the following areas (hours listed are minimums):

NC1. Introduction to net-centric computing [core]	2
NC2. Communication and networking [core]	12
NC3. Network security [core]	3
NC4*. The web as an example of client-server computing [core]	3
NC6. Network management [elective]	6
NC9. Wireless and mobile computing [elective]	6
SE2. Using APIs [core]	2

*\* general client-server computing principles*

---

Course Coordinator: Wenzhan Song  
Last Updated: October 5, 2006 (Approved)  
Syllabus Version Number: 1.2