Course Number: CSC 645/745  
Course Title: Computer Networks  
Number of Credits: 3  
Schedule: Three hours of lecture/discussion per week.  
Prerequisite: CSC 415 with grade of C or above. Students should be familiar with process management, memory management, I/O processing and file system implementation techniques. A good working knowledge of the C/C++ programming language is prerequisite.

Catalog Description
Computer network design, evaluation, and testing. Computer network standards and implementation. Hardware/software design and compatibility issues. Paired with CSC 745. Students who have completed CSC 645 may not take CSC 745 later for credit. Extra fee required.

Spring 2007 Detailed Description
This course will introduce advanced computer science students to networking and internetworking. The design, implementation, and use of the DARPA Internet Protocols (TCP/IP) will be discussed in detail. The ISO/OSI reference model and layer protocol standards will be surveyed and compared with TCP/IP. Basic analytic techniques used in network design and performance evaluation will be introduced, along with advanced C/Unix programming techniques.

Expanded Description
1 Introduction, Internetworking, ISO/OSI Protocol Stacks and Services
2 Network Hardware, Physical-Data Link-Network Layers MAC Layers/ Introduction to WLAN and CC, Ethernet, ARQ (Windowing) protocols
3 Internetworking, RARP, ARP, IPv4 & IPv6, ICMP
4 Programming with the Internet: Sockets & other Unix Systems Calls
5 Internetwork Routing, X75 VC
6 Implementing Applications Oriented Services, UDP/TCP, Client/Server Interaction, software development using high level networking frameworks
7 Advanced Topics (as time permits): Name Servers, ISO Transport, Session, Presentation, Application Layers

Course Objectives and Role in Program
The objectives of this course include:
• Introduce the student to the TCP/IP Internet protocols and techniques for implementing distributed applications using the socket systems calls
• Teach advanced C programming (using low level system calls and appropriate debugging techniques) in a Unix/Linux environment
• Review process management and IPC from the CSC 415 Operating Systems course prerequisite

Students will implement and evaluate a series of programs utilizing low level Unix system calls culminating in a sliding window implementation and evaluation, then work through a series of programming labs to develop a RPC library (using both TCP and UDP
sockets) and a simple distributed application. A working knowledge of advanced programming techniques (including development of distributed sockets-based applications) and the Unix/Linux platform play an important role in developing our students into skilled professional programmers.

Learning Outcomes
At the end of this course students will

- Write correct and well documented advanced C code using low level Unix/Linux system calls, including the sockets family of system calls, that is demonstrated to execute correctly
- Know where to look for platform specific programming information and be familiar with reading and using man page information as well as other standard reference materials
- Clearly and accurately explain design decisions in written program documentation
- Be familiar with the mechanics of Unix/Linux distributed application programming, testing and debugging in a multi-machine environment.

Method of Evaluation
Student learning will be evaluated on the basis of

- Completeness and quality of programming/homework assignments.
- Grade on quizzes after each major topic is completed
- Grade on final examination
- Class participation.

The weight assigned to each element of evaluation will be determined by the instructor of the course on the first day of the class.

Required Textbooks

M. Murphy, “CSC 645/745 Course Reader, Spring 2007”, published on-campus

Additional Supplementary readings are available through the SFSU Library On-Line Reserves (ERES) and/or posted to the class Web site.

Recommended References

Modified by: M. Murphy

Date of Last Modification: Spring 2007