Computer Networking

Course Number: CSC 375
Course Title: Computer Networking
Credit Hours: 3.0
Equate Hours: 3.0
Class Hours: 3.0

Pre Requisite: CSC 215 Modern Programming
Pre/Co-requisite: ENG 93/ESL 91/ESL 93 or equivalent

Course Description: This course studies the design principles of network infrastructure and how these designs may be compromised and how they work. Thus, it presents principles and methodologies used in the design and implementation of modern computer networks and networked information systems. Topics include: shared use of a multiple access channel, error detection and recovery, and flow and congestion control. This course studies packet switched networks, routing protocols, internet protocols and protocols at each layer. This course also introduces network programming-algorithms and procedures for secure and reliable transport over best-effort deliver systems. Students will develop several client-server applications such as writing a simple networking service at the I.P. layer or higher.


Grade is based upon Programming Projects and Final Exam:
Students will complete 3-4 simulation projects in a computer laboratory 30%
Midterm 30%
Final 40%

Student Learning Objectives
1) Student will demonstrate ability for designing fundamentals of network systems
2) Student will demonstrate ability to apply principles of application layer protocols
3) Students will demonstrate ability to apply principles of applications with transport layer
4) Student will demonstrate ability to apply routing principles and algorithms involved with the Network layer
5) Student will demonstrate a fundamentals knowledge involved in probability and operational analysis of networks
6) Students will demonstrate ability to work with network simulation tools
Course Outline

Part 1: Introduction
   The Internet and its layered architecture
   Delay and Loss in Packet-Switched Networks
   Internet Backbones, NAPs and ISPs

Part 2: The Application Layer
   Principles of Application-Layer Protocols
   Important application-layer protocols: HTTP, FTP, Electronic-Mails, DNS, etc.
   Socket Programming

Part 3: The Transport Layer
   Transport-Layer Services and Principles
   Multiplexing and Demultiplexing Applications
   Principle of Reliable Data Transfer
   Principle of Congestion Control
   UDP, TCP

Part 4: The Network Layer
   Routing Principles and Algorithms
   IP: the Internet Protocol

Part 5: The Link Layer and Local Area Networks
   Introduction on the Data Link Layer and its services
   Error Detection and Correction
   Multiple Access Protocols
   LAN and ARP
   PPP: Point-to-Point Protocol
   ATM

Part 6: Wireless Networks
   IEEE 802.11
   Handling Mobility
   Ad-hoc wireless networks
   Cellular networks

Part 7: Security in Computer Networks
   Principles of Cryptography
   Authentication and Authorization
   Key Management Protocols
   Firewalls
   Attacks and countermeasures