Department and Course Number	**CEG 402**	Course Coordinator	Bin Wang
Course Title	**Introduction to Computer Communication**	Total Credits	4

BS CE: Required; BS CS: Elective.

This document was prepared by: Bin Wang Date: May 05, 2005

Catalog Description

Introduction to Computer Communication Design Survey of modern digital communications techniques. Focus on serial transmission over public communications channels. Topics include information content and coding, asynchronous and synchronous formats, concentrating and multiplexing, channel properties, modulation techniques, common carrier services, error sources and control, regulatory policies, and networks and their analyses. Students must design both hardware and software components of computer communications systems. **Prerequisite**: CS 400.

Textbooks and Other Source Materials

1. Computer Networking: A top-down approach featuring the Internet, 3rd Ed. Kurose & Ross, Addison-Wesley, 2005.
2. CEG 402/602 Lab Manual, P. Chen, 1996.

Home Page

http://www.cs.wright.edu/~bwang/ceg402.htm

Course Objectives

The student will learn the following:

1. OSI seven-layer model/Internet protocol five-layer model
2. Classification of networks and network services
3. Representative application layer protocols: HTTP, DNS, ftp etc.
4. Principles of reliable data transfer and flow control
5. Transport layer protocols: TCP and UDP
6. Internet protocol
7. Internet routing protocol
8. Multiple access protocols
9. Local area networks
10. Serial communication using UART for Data-Link layer
11. Implementation of Internet protocol and communication using UART

Prerequisites by Topic

1. Basic microprocessor architecture
2. C or C++
3. Development tools such as editors, compilers, linkers, debuggers
4. Data structure tools such as arrays, stacks, queues, lists, binary trees
5. Design of algorithms and analysis of algorithms for efficiency

Major Topics Covered in the Course

1	Introduction: computer networks and the Internet; Basic networking concepts
2	Application layer: DNS, Web and HTTP
3	Application layer: FTP, email, content distribution, peer-to-peer applications etc
4	Transport layer: principles of transport layer protocols; UDP
5	Transport layer: principle of reliable transfer (stop and wait, sliding window, …)
6	Transport layer: TCP, reliable data delivery, connection management, flow control
7	Network layer and routing: router architecture, IP, IP addressing, packet forwarding
8	Routing algorithm: link state routing, distance vector routing
9	Link layer: Error detection and correction techniques MAC protocols
A	LAN addressing and ARP, Ethernet, Hubs, Bridges, Switches, PPP, wireless network basics

Class/Laboratory Schedule

Each week has two lectures of 75-minutes each. There is no scheduled lab. Students are expected to work in open labs for no less than 2 hours a week. Lab work is a significant part of this course. There are projects for the course. Labs constitute 30% of total grade. The labs are described in P. Chen, CEG 402/602 Lab Manual, 1996.

Contribution to Professional Component

CEG 402 contributes 4 hours to the Criterion 4(b), and also contains engineering design.

Course Contribution to Program Educational Objectives

CEG 402 contributes to Objectives 1 and 2. Networking knowledge is crucial to a computer engineer in this Internet-based world. The experience gained through the course project is realistic.

Course Contribution to Program Outcomes and Assessment

a	b	c	d	e	f	g	h	i	j	k
PXX	PXX	PXX	0	PX	PXX	P	PX	PXX	PXX	PXX

Estimate CSAB Category Content

	Core	Advanced		Core	Advanced
Data Structures			Concepts of PL		
Algorithms		2.0	Comp Organization + Architecture		3.0
Software Design		1.0	Other		

Oral and Written Communications

There are no oral presentations. Students submit source code of their projects along with a "ReadMe", a text file that highlights the design details as well as problems and defects in their program. We do not claim that the ReadMe.txt constitutes written communications.

Social and Ethical Issues

None.

Theoretical Content

None.

Problem Analysis

The projects are about a component of network systems reduced in size and sophistication to fit a 10-week course. Detailed analyses of the requirements of the project, e.g., the implementation of a certain protocol, are performed by the student before implementing them.

Solution Design

The projects are about a component of network systems reduced in size and sophistication to fit a 10-week course. Skeletal solutions of the project, e.g., the implementation of a certain protocol, are given by the instructor at the conceptual level in the lectures, and also in source code files. The student needs to design further details and implement them.

Learning Outcomes

By the end of the quarter, the students will be able to apply the concepts learned to:

1. Design and configuration of subnet in Internet
2. Decomposition of complex networks to simple ones
3. Decomposition of protocol stack to layers and analysis of interaction of protocol layers
4. Design and analysis of reliable data communication protocols
5. Design and analysis of routing algorithms and protocols
6. Design of programs using UART and interrupt controller
7. Design and implementation of a local area network communication using UART and interrupt controller

Outcome Measures and Assessment

Student progress in achieving the desired objectives and outcomes for this course will be monitored and measured through use of entrance and exit surveys, lab projects, homework, quizzes, and examinations.