CSET 2200 PC & Industrial Networks (4 semester credit hours)   CSET Required
IT Required

Current Catalog Description:
Current concepts and technologies used with personal computers and PLCs in both industrial (factory-floor) and commercial data networks. Topics include PC networking hardware and software, PLC hardware and programming and PLC networking alternatives. Prerequisite: EET 2230

Textbooks:
"Computer Networks and Internets (5th Edition)," 5th edition, 2008 Author: Douglas Comer Publisher: Pearson (Prentice Hall), ISBN: 0136066984

References:
Course web pages: http://cset.sp.utoledo.edu/~hwang/cset2200

Related Program Outcomes:
CSET Program Outcomes are (b, i and j)
IT Program Outcomes are (b, i and j)

Course Objectives:
After successful completion of this course, students will be able to:
- Use Cisco switch networking to plan and deploy local area networks.
- Provide an understanding of sub-networks
- Work with the Basic Internetworking concepts:
  o Understand and analyze the functions of the Internet protocol suite: TCP/IP
  o Debug transport level services
  o Basic understanding of application services: E-mail, FTP, Rlogin etc.
- Gain hands-on experience with network hardware
  o Switches
- Gain an understanding and hands on experience with the network analytical tool Wrieshark and
  o Troubleshoot Local and wide area connectivity problems
  o Diagnose packets, frames and segments traversing a network.
- Gain hands-on experience with real-world Cisco switches
  o Implement Basic IOS Configuration
  o Describe Remote Management
  o Develop and implement network designs

Major Topics Covered in the Course

Topic	Lecture Hours	Lab Hours
Networks and Inter-networks	3	
The OSI Model	3	
Physical Layer	3	2
Data Link Layer: ARP, Bridge, CSMA/CD, Virtual LAN	9	6
Transport Layer and Session Layer: TCP , UDP	6	4
Presentation and Application Layer	3	2
Network Layer: IP, ICMP, Traceroute,	3	4
IP Addressing and Sub-netting: IPv4, DHCP,IPv6	6	4
Basic Router Operations and Configuration	3	4
Network Security: Basic Cryptology, Secure Communication	3	2
Totals	42	28

Laboratory Projects:

A sequence of 6 Wireshark network analytical labs. A cable making lab , a bridge lab, a switch configuration lab and a Virtual LAN lab.

Oral and Written Communications

Midterm and Final examinations are written using essay format.

Social and Ethical Issues

The topics discussed in the Application Layer in the OSI model include data (packet) capture and analysis. The ethical implications of capturing data packets in the application layer are discussed and examined. The social and ethical implications of Denial of Service (DOS) attacks and defenses and intrusion detection are discussed in the Network Security topics. Students are given an essay question on the midterm and responses are graded. Three hours of class time is spent on this topic.

Theoretical Content

Theoretical content includes:

Introduction to computer networks, their hardware and software. [1 week]
Presentation layer protocols [1 week]
Connection oriented and connectionless services. [1 week]
Circuit switching and packet switching. [0.5 week]
OSI and TCP/IP reference models. [3.5 weeks]
    Discussion of physical, data-link layers of the OSI Model
    Discussion of network layer of the OSI Model
    Discussion of the transport, and session layers of the OSI Model
    Discussion of the presentation and application layer of the OSI Model.
Transmission media and multiplexing. [1 week]
Data link layer protocols: multiple access protocols and LANs using CSMA/CD [1 week]

Netwok security concepts. [1 week]
Network layer [2 weeks]
    LAN design issues.
    IP Address allocation and subnetting/supernetting issues

Problem Analysis
In the Wrieshark lab, students are required to analyze the packets related to specific network problems. In the exam, students are required to analyze data communication problems.

Solution Design
Students need to construction Bridge and Virtual LAN.

Course Coordinator:
Hong Wang (hong.wang2@utoledo.edu)
5-26-2011

Syllabus: CSET 2200

	Student Outcomes: **CSET Program**	Course Outcomes	Assessment Methods
a	an ability to select and apply knowledge of computing and mathematics appropriate to the discipline. Specifically, an ability to apply mathematical foundations, algorithmic principles, and computer science theory in the modeling and design of computer-based systems in a way that demonstrates comprehension of the tradeoffs involved in design choices. [CAC-j]		
b	an ability to analyze a problem, and identify and define the computing requirements appropriate to its solution.	Students will be able to solve a variety of LAN based data transmission problems.	Midterm Examination problem – Understand IP network communication
c	an ability to design, implement, and evaluate a computer-based system, process, component, or program to meet desired needs. Specifically, an ability to apply design and development principles in the construction of software systems of varying complexity. [CAC-k]		
d	an ability to function effectively as a member or leader on technical teams to accomplish a common goal.		
e	an understanding of professional, ethical, legal, security and social issues and responsibilities including a respect for diversity.		
f	an ability to communicate effectively with a range of audiences using a range of modalities including written, oral and graphical.		
g	an ability to analyze the local and global impact of computing on individuals, organizations, and society.		
h	recognition and understanding of the need for and an ability to engage in self-directed continuing professional development.		
i	an ability to select and apply current techniques, skills, and tools necessary for computing practice.	Students will be able to troubleshoot LAN and WAN problems.	Graded Wireshark Labs and Virtual LAN Lab.
j	an ability to conduct standard tests and measurements; to conduct, analyze, and interpret experiments; and to apply experimental results to improve processes.	Student will be able to use Wireshark to analyze, interpret and trouble shoot network problems in experiments	Graded Wireshark labs.
k	a commitment to quality, timeliness, and continuous improvement.		

Syllabus: CSET 2200

	Student Outcomes: **IT Program**	Course Outcomes	Assessment Methods
a	an ability to select and apply knowledge of computing and mathematics appropriate to the discipline. Specifically, an ability to use and apply current technical concepts and practices in the core information technologies. [IT-j]		
b	an ability to analyze a problem, and identify and define the computing requirements appropriate to its solution.	Students will be able to solve a variety of LAN based data transmission problems.	Midterm Examination problem – Understand IP network communication
c	an ability to design, implement, and evaluate a computer-based system, process, component, or program to meet desired needs. And, an ability to identify and analyze user needs and take them into account in the selection, creation, evaluation and administration of computer-based systems. [IT-k]		
d	an ability to function effectively as a member or leader on technical teams to accomplish a common goal.		
e	an understanding of professional, ethical, legal, security and social issues and responsibilities including a respect for diversity.		
f	an ability to communicate effectively with a range of audiences using a range of modalities including written, oral and graphical.		
g	an ability to analyze the local and global impact of computing on individuals, organizations, and society.		
h	recognition and understanding of the need for and an ability to engage in self-directed continuing professional development.		
i	an ability to select and apply current techniques, skills, and tools necessary for computing practice. And an ability to effectively integrate IT-based solutions into the user environment. [IT-l]	Students will be able to troubleshoot LAN and WAN problems.	Graded Wireshark Labs and Virtual LAN Lab.
j	an understanding of best practices and their application. [IT-m]	Student will be able to use Wireshark to analyze, interpret and trouble shoot network problems in experiments	Graded Wireshark labs
k	an ability to assist in the creation of an effective project plan. [IT-n]		