COURSE OUTLINE

ELEC 380 – LAN/WAN Technology

Prepared By: Stephen E. Frempong
ELEC 380– LAN/WAN Technology

A. **TITLE**: LAN/WAN Technology

B. **COURSE NUMBER**: ELEC 380

C. **CREDIT HOURS**: 3

D. **WRITING INTENSIVE COURSE**: NO

E. **WEEKS PER SEMESTER**: 15

F. **SEMESTER OFFERED**: SPRING

G. **HOURS OF LECTURE, LABORATORY, RECITATION, TUTORIAL, ACTIVITY**: 2 hours lecture and 2 hours laboratory per week

H. **CATALOG DESCRIPTION**: This course will cover topics include: Network topologies and connectivity devices, TCP/IP protocol suite and internet protocol addressing, networks and sub-networks, network-layer protocols, internet control message protocol, transport layer protocol, internet protocol version 6, configuration and domain name protocols, and Integrated Services Data Networks (ISDN).

I. **PRE-REQUISITES/CO-COURSES**: ELEC 225 [Telecommunications], or permission of program director.

J. **GOALS (STUDENT LEARNING OUTCOMES)**

**Institutional Student Learning Objectives (SLO)**

(1) Communication (2) Critical Thinking (3) Professional Competence

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<tr>
<th>Course Objectives / ABET (SLO)</th>
<th>Institutional SLO</th>
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<tr>
<td>Will understand the fundamental terminology used in data communications and computer networking.</td>
<td>2. Critical Thinking</td>
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<td>Will understand the basic standards and protocols of computer networking.</td>
<td>2. Critical Thinking</td>
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<td>Explain the basic architecture and implementations of Local Area Networks (LANs) and Wide Area</td>
<td>2. Critical Thinking</td>
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Networks (WAN’s)

| Apply the knowledge to properly manage the basic functions of Cisco Ethernet switches and routers | 2. Critical Thinking | 3. Professional Competence |

K. **TEXTS:**

L. **REFERENCE:**

M. **EQUIPMENT:** Will use Network Laboratory Equipment

N. **GRADING METHOD:** A-F

O. **MEASUREMENT CRITERIA/METHODS:** Examination performance, Laboratory project, Class Participation, and Assignment.

P. **DETAILED TOPICAL OUTLINE:**

1. Introduction to the OSI Model
   a. The need for standardization
   b. The OSI reference model

2. Connectivity Devices
   a. Repeaters
   b. Hubs
   c. Bridges and Switching Hubs
   d. Routers and Brouters
   e. Gateways

3. Network Technology and Protocol
   a. TCP/IP
   b. IPX and SPX
   c. SAP and NCP Protocols

4. IP Addressing
a. IPV4/IPV6 Addressing
b. Subnetting the Network
c. Variable Length Subnet Masks
d. Classless Interdomain Routing
e. Networking Address Translation and Proxy Servers

5. Ethernet, Token Ring, and FDDI

a. Ethernet Encoding Method
b. Ethernet Frame Types
c. 10Base5, 10Base2, 10BaseT, and 100 Mbps Ethernet
d. Gigabit Ethernet
e. Token Ring
f. FDDI
g. Testing Cable Systems

6. Using Bridges and Switches

a. Segmentation
b. Basic and Transparent Bridges
c. The Spanning Tree Algorithm
d. Switches (Layer 3, and Layer 4)
e. Virtual LANs (Trunking and Configuration)
f. Indirect FM Generation
g. Designing LANs

7. WAN Technology

a. WAN Devices
b. PSTNs
c. Leased Digital Lines
d. Digital Subscriber Lines
e. Circuit Switched Lines
f. Cable Modems
g. Synchronous Digital Hierarchy and Synchronous Optical Networks
h. Networking with WAN Links

8. Introduction to Routers and Routing

a. Characteristics of Router Protocols
b. The IP Routing Protocol
c. Gateway Protocols
d. IP Multicast
e. IPX Routing Protocols

9. Introduction to Cisco Routers
a. Cisco Router Basics  
b. Router Memory  
c. Configuring Files  
   Range of Cisco Routers  
d. Router Ports  

Q. **LABORATORY OUTLINE:**

1. Construct CAT5 Crossover Cable  
2. Construct CAT5 Patch Cable  
3. Building a Basic Network with Hubs and Computers  
4. Building a Network with Cisco Switch  
5. Building a Network with Cisco Router  
6. Router Configuration  
7. Network Troubleshooting