COURSE OUTLINE

Course Number **NET 104**	Course Title **Fundamentals of Computer Networks**	Credits **3**
Hours: **Lecture/Lab/Other** **2/2/0**	**Co-requisite** **ENG 101**	**Implementation** **Semester & Year** **Fall 2022**

Catalog description:

Fundamentals of data communications theory, network management, connectivity, the OSI model, and internetworking protocols and standards. Covers topologies, architectures, operating systems, security, LAN/WAN components, modem implementation, LAN troubleshooting and support resources, fault tolerance, network adapters, and client-server environments. Assists students preparing for the Network+ Certification exam.

General Education Category: Not GenEd	**Course coordinator:** Winston H. Maddox, Professor Networking. Information Technology and Cybersecurity 609.570.3867, maddoxw@mccc.edu

Required texts & Other materials:
- TESTOut Web Material ISBN:(978-1-935080-43-5)

Course Student Learning Outcomes (SLO):
Upon successful completion of this course, the student will be able to:

1. Identify the components of a LAN and determine the type of network design most appropriate for a given site. **(Supports ILGs 2, 11; PLOs 1, 3,)**

2. Identify the different media used in network communications, distinguish between them, and determine how to use them to connect servers and workstations in a network. **(Supports ILGs 4; PLOs 3, 5)**

3. Distinguish between the different networking standards, protocols, and access methods, and determine which would be most appropriate for a given LAN. **(Supports ILGs 4; PLOs 1, 5)**

4. Recognize the primary network architectures, identify their major characteristics, and determine which would be the most appropriate for a proposed LAN. **(Supports ILGs 4, 11; PLOs 3,6,7)**

5. Identify the primary functions of network operating systems and distinguish between a centralized computing environment and a client/server environment. **(Supports ILGs 2, 4, 11 PLOs 2, 5, 7)**

6. Determine how to implement and support the major networking components (including the server, operating system, and clients), and propose a system for adequately securing data on a given LAN and protecting the system's components. **(Supports ILGs 4, 11; PLOs 7,8)**

7. Identify strategic LAN support tools and resources and determine how to use these in troubleshooting basic network problems. **(Supports ILGs 2, 4, 9, 11, PLOs 6, 7, 8)**

Course-specific Institutional Learning Goals (ILG):

Institutional Learning Goal 2. Mathematics. Students will use appropriate mathematical and statistical concepts and operations to interpret data and to solve problems.

Institutional Learning Goal 4. Technology. Students will use computer systems or other appropriate forms of technology to achieve educational and personal goals.

Institutional Learning Goal 9. Ethical Reasoning and Action. Students will understand ethical frameworks, issues, and situations.

Institutional Learning Goal 11. Critical Thinking: Students will use critical thinking skills understand, analyze, or apply information or solve problems.

Program Learning Outcomes for Information Technology (A.A.S. degree)

1. Understand, configure, and install hardware and software, including Internet user software;
2. Understand, describe, and apply network protocols and standards;
3. Explain computing practices and procedures found in most organizations;
4. Use printed and online technical documentation;
5. Describe how the Internet works;
6. Work effectively individually and in workgroups to install and implement information technology;
7. Demonstrate written and oral communication skills.
8. Pass industry certifications, including A+, NET+, Linux+, and Security+; Microsoft's MCTS, MCITP, MCSA, and MCSE; and Cisco's CCNA.

Units of study in detail – Unit Student Learning Outcomes:

Unit I   [Unit I Introduction and Networking Basics] [Supports Course SLO # 1, 2]

Learning Objectives
The student will be able to…
- Define Network Topologies
- Discuss The OSI Model
- Describe network protocols
- Differentiate numbering systems

Unit II   [Unit II Cables and Connectors] [Supports Course SLO # 1, 2]

Learning Objectives
The student will be able to…
- Describe Twisted Pair, Coaxial, and Fiber Optic cabling.
- Differentiate between different Wiring Implementations.
- Install and configure Ethernet Networks including Connecting a Cable Modem, Connecting Fiber Optic Cables, and Connecting Patch Panel Cables.

Unit III   **[Unit III Networking Devices] [Supports Course SLO # 1, 2]**

Learning Objectives
The student will be able to…
- Define Network Adapters, Network Devices, and Internetwork Devices.
- Install and configure Network Adapters, Media Converters, and Hubs
- Select the appropriate Networking Device, including a Router.

Unit IV   **[Unit IV Ethernet] [Supports Course SLO # 1, 3]**

Learning Objectives
The student will be able to…
- Define Ethernet Specifications
- Connect Network Devices.
- Reconnect to an Ethernet Network

Unit V   **[Unit V IP Configuration] [Supports Course SLO #, 3]**

Learning Objectives
The student will be able to…
- Explain IP Addressing, APIPA and Alternate Addressing, DHCP Server Configuration, DHCP Relay, DNS Name Resolution, IP Version 6, and Multicast.
- Configure IP Addresses
- Configure IP Addresses on Mobile Devices.
- Configure Alternate Addressing.
- Configure a DHCP Server, Options, Exclusions, Client Reservations, Clients, and Relay Agents.
- Add a DHCP Server on Another Subnet.
- Configure DNS Addresses
- Create Standard DNS Zones, Host Records, and CNAME Records.
- Troubleshoot DNS Records.
- Configure an IPv6 Addresses.

Unit VI   **[Unit VI Switch Management] [Supports Course SLO #1, 2]**

Learning Objectives
The student will be able to…
- Describe Switch Access, Switch IP Configuration, Switch Interface Configuration, Virtual LANs, Trunking, and Spanning Tree Protocol.
- Configure Management VLAN Settings, Switch IP Settings, Ports, VLANs, Trunks, Native VLANs, Allowed VLANs, Root Bridges, and Rapid PVST+.

Unit VII   **[Unit VII Routing] [Supports Course SLO # 2, 3, 7]**

   Learning Objectives
   The student will be able to…
   - Identify Routing Protocols.
   - Describe Network Address Translation.
   - Configure Static Routes
   - Enable OSPF Routing

Unit VIII   **[Unit VIII Firewalls] [Supports Course SLO # 1]**

   Learning Objectives
   The student will be able to…
   - Design and Implement Firewalls.
   - Configure Host Firewalls, Network Security Appliances, DMZs, and Perimeter Firewalls

Unit IX   **[Unit IX Network Customization] [Supports Course SLO #, 3]**

   Learning Objectives
   The student will be able to…
   - Explain Network-Based Storage.
   - Describe Voice over IP (VoIP).
   - Navigate Virtualization.
   - List Cloud Computing solutions.
   - Discuss Virtual Networking.
   - Configure an iSCSI Target and Initiator.
   - Configure VoIP.

Unit X   **[Unit X Wireless Networking] [Supports Course SLO # 2, 3]**

   Learning Objectives
   The student will be able to:
   - Identify Wireless Standards.
   - Design and configure indoor and outdoor Wireless Networks.
   - Describe Wireless Security.
   - Create and secure a Home Wireless Network.
   - Configure Wireless Profiles.
   - Implement and secure an Enterprise Wireless Network.

Unit XI   **[Unit XI Wide Area Networks (WANs)] [Supports Course SLO # 1, 2, 3, 8]**

   Learning Objectives
   The student will be able to…
- Describe WAN Concepts and connection types.
- Discuss Internet connectivity.
- Outline steps for Remote Access
- Configure a PPP WAN Link
- Connect to a DSL Network

Unit XII   **[Unit XII Network Policies and Procedures] [Supports Course SLO # 6, 7, 8]**

   Learning Objectives
   The student will be able to…
- Identify Network Design Documents and Policies.
- Utilize Security Policies.
- Describe Risk Management.

Unit XIII   **[Unit XIII Network Security] [Supports Course SLO # 3. 6, 7, 8]**

   Learning Objectives
   The student will be able to…
- Describe Physical Security.
- List Network Vulnerabilities and Threats.
- Define Remote Access Security.
- Describe Social Engineering
- State typical precautions to observe when working on computer equipment.
- Perform Authentication
- Implement Physical Security
- Respond to Social Engineering Exploits
- Configure a VPN Connection
- Configure Mobile Device VPN Connection

Unit XIV   **[Unit XIV Network Hardening] [Supports Course SLO # 3. 6, 7, 8]**

   Learning Objectives
   The student will be able to…
- Demonstrate Penetration Testing.
- List Detection and Prevention steps.
- Define Network Hardening.
- Configure Intrusion Prevention
- Enable Wireless Intrusion Prevention
- Perform Port Security procedures.

Unit XV   **[Unit XV Network Management] [Supports Course SLO # 1, 2]**

Learning Objectives
The student will be able to…
- Describe Update Management.
- List Data Protection procedures.
- Define Log File Management.
- Describe Network Management with SNMP
- State typical precautions to observe when working with Remote Management
- Perform Mobile Device Management
- Implement Monitoring
- Create a Guest Network for BYOD
- Allow Remote Desktop Connections

Evaluation of student learning: [Evaluates SLOs #1, 2, 3, 4, 7]

Students' achievement of the course objectives will be evaluated through the use of the following:

- TESTOut Lab assignments assessing students' computer hardware comprehension skills related to the unit objectives.
- TESTOut Lab Chapter quizzes assessing students' comprehension of software computer concepts related to the unit objectives.
- Research and Final Research presentation assessing students' comprehension through the use of word, PowerPoint and graphics to demonstrate knowledge,
- Basic programming Labs and Quizzes assignments assessing students' basic comprehension of hardware functions and skills related to the unit objectives.
- Exams and Final Research Presentation assessing students' comprehension of computer concepts and applications related to the unit objectives.

Grade Criteria

Item	Percent	Description
TESTOut Labs	10%	Activity-based lab Assignment in Excel
TESTOut Quizzes	10%	15 Question quiz for each unit of Computer Concepts
Exams	35%	3 Assignment based on your IT Topics leading to the final project
Final Research Presentation	45%	Professional Presentation