BM ET 2303

Networking Fundamentals

About Us

The College of Biomedical Equipment Technology (CBET) is a majority Veteran owned and operated private college offering Biomedical Equipment Technician (BMET), Healthcare Technology Management (HTM) and Healthcare Information Systems Management training at the certificate and associates degree levels. Our leadership team is comprised of individuals with decades of experience in the healthcare industry and education. Similarly, our instructional staff is comprised of industry experts and award-winning educators dedicated to providing quality education, training, and career services to our students.

Locations

Main Campus
105 Windy Meadows, Suites 201
Schertz, Texas 78154
www.cbet.edu

Mission

"The College of Biomedical Equipment Technology delivers premier education and training in Healthcare Technology Management and Information Technology to equip students to meet the evolving needs of the industries we serve."

ABOUT THE COURSE

Networking Fundamentals I The Professional Career Development course will develop a foundation and understanding of network fundamentals. BMET Networking Fundamentals will focus on subjects including IP addressing, network models, cabling and topology, Ethernet, TCP/IP, routing, network naming, and securing TCP/IP.

- IPv4 vs IPv6
- Network Operations
- Virtualization and Cloud
- Manage, Configure, and Troubleshooting Networks

COURSE DESCRIPTION

This 6-week course is designed to strengthen the students understanding of basic networking concepts and terminology. They will develop an understanding of local area networks (LAN), wide area networks (WAN), the internet, security, cabling, network naming, and applications as it relates to networks. The students will learn the components and topography of local area networks and networking standards; how to configure routers, switches, and wireless devices; features and benefits of wireless devices and virtual LANs. Students will also develop a solid foundation in the field of networking, master the competencies, terminologies, and practical applications of networking via the Cisco Packet tracer simulation environment.

LEARNING OBJECTIVES

LO1. Illustrate knowledge of the 7-layer OSI model. Articulate the network topology types and the cabling and connectors required to create a network.
LO2. Define and describe Ethernet implementations, standards, and utilization. Students will develop a working knowledge of Ethernet cabling and Gigabit Ethernet protocols.
LO3. Develop an understanding of basic network components and structure. Knowledge of TCP/IP protocol suite implementation and application.
LO4. Explain network routing, router configuration, and installing a router in a network. Define common ports, and their functions in relationship to a TCP/IP network.
LO5. Describe the functions and capabilities of a Domain name server (DNS). Understand TCP/IP utilities and tools for securing a TCP/IP network.
LO6. Demonstrate the ability to manage, configure, and troubleshoot network infrastructure as a whole.

TIME-ON-TASK

Time on task is the total learning time spent by a student in this course, including instructional time and time spent studying and completing course assignments and other activities (e.g., reading, research, writing, individual and group projects.) These activities are:

- Attending the weekly webinars
- Reading course presentations/ “lectures”
- Reviewing course notes
- Reading assignment references, books, or other course materials
- Participation in online discussions
- Conducting research
- Writing papers or other assignments
- Completing other assignments (e.g., projects)

The entire course Time-on-Task is 121 hours.

Instructional Team

The Networking Fundamentals I course is led by a talented and seasoned instructor via webinar and interactive distance learning formats. In addition to the weekly live sessions, instructors are accessible via the Learning Management System (LMS) daily, and by appointment via Zoom between the hours of Monday through Friday from 0800-1700 (CST).

Monique LaPlante serves as a current Project Manager at the College of Biomedical Equipment Technology. She currently teaches both Networking I and Networking II along with the Biomedical & Imaging Information course. Monique often enjoys creating new curriculum material for her students and has aided in the planning of many major events for the CyberTexas Foundation such as the San Antonio Mayor's Cyber Cup as their previous Program Manager. She has been a Texan for the past 14 years and has developed a love for Cybersecurity since her freshman year of high school when she became one of the founding members of the Winston Churchill Army JROTC CyberPatriot team. She then went on to pursue teaching various tech courses through the summer camp program with ID tech camps at Trinity University, and later became a student instructor at UTSA. Additionally, she has gone on to graduate with her BBA in Cybersecurity with a Minor in Information Systems from UTSA, in addition to her Master of Science in Information Technology with a concentration in Cybersecurity. She is currently pursuing her PhD in Business Management with a focus in Info Technology Management. Throughout the course, Monique can be contacted directly through CANVAS messaging or via email at mlaplante@cbet.edu, during office hours, Monday through Friday, 0800-1700 CST.

Instructional Methods and Activities

The student online learning environment is structured to mirror the course syllabus and includes all the information students require to successfully navigate the course. The online learning environment, referred to as CANVAS, provides a means for students to engage, communicate, and learn. CBET instructors will actively engage students in CANVAS via discussion board forums and other activities designed to cultivate student engagement and participation.

Online Classes (Daily): Students are expected to engage in CANVAS. Courses include weekly assignments, quizzes, tests, and other requirements prescribed by the instructor. Students are responsible for completing weekly assignments in a timely manner as prescribed by the instructor(s). It is important to remember that in addition to the resulting grades, completion of weekly assignments is also used to measure student engagement, attendance, and participation.

Weekly Live Webinars: Mandatory Instructor-led webinars will be conducted at least once per week (60 Minutes). Additionally, students may request one-on-one counseling or tutoring sessions based on the instructor's availability. Webinars are not optional; however, we understand that from time-to-time students may not be able to attend in person. If you cannot attend a live session, the webinars will be posted in CANVAS for review.

Online Discussion Forum (Daily/Weekly): CANVAS includes a discussion board with weekly prompts and instructions for completing daily/weekly assignments. Students are required to respond to all weekly discussion board topics and instructor-directed prompts. Responses must be substantive and meet the minimum word count requirement. Additionally, students are required to engage with peers by responding to no fewer than two student responses per week. Student participation and attendance in CANVAS is reported to the Director of Education on a weekly basis and the information is used, in part, to measure attendance and participation in the course.

Packet Tracer is a free network simulator tool for certification exam preparation, particularly for CCNA students. It's available directly through the Cisco Networking Academy. Packet Tracer is a product of Cisco, Inc. All Rights Reserved.

Late/Make-up work: All assignments must be completed on time and as instructed to receive full credit. Make-up work shall:

1. Be supervised by an instructor approved for the subject being made up.
2. Require the student to demonstrate the same knowledge or competence expected of a student who attended the scheduled class session.
3. No more than 5% of the missed work can be made up. All work must be completed and submitted within seven (7) calendar days of its original due date. All coursework must be submitted no later than six (6) calendar days after the course ends.

WEEK 1/MODULE 1 (The OSI Model and Packet Tracer Familiarization)

Learning Objective 1: Identify connection concepts to include client, server, and peer networks. Understand virtual private networks for connecting remote users. Manage devices that handle switching, security, and connectivity. Understand the evolution of IP addressing to IPv6.	
TLO 1	Explain the use and purpose of network services.
TLO 2	Compare and contrast various devices, their features, and their appropriate placement on them network.
TLO 3	Compare and contrast routing technologies and bandwidth management concepts.
TLO 4	Explain high availability and disaster recovery concepts and summarize which is the best solution.
TLO 5	Describe the functions and capabilities of a Domain name server (DNS). Understand TCP/IP utilities and tools for securing a TCP/IP network.
TLO 6	Discuss the fundamental concepts of IPv4 and IPv6.
TLO 7	Implement IPv6 in a TCP/IP network with Cisco Packet Tracer by creating a simple network.

Module 1 Overview:

During the first week of class, students will compare and contrast the managed and unmanaged switch concepts Compare and contrast various devices, their features, and their appropriate placement on them network. Compare and contrast routing technologies and bandwidth management concepts. Explain high availability and disaster recovery concepts and summarize which is the best solution. Discuss the fundamental concepts of IPv4 and IPv6. Students should be familiar with Cisco Packet Tracer, a free online network simulation tool. Students will be required to participate in a webinar to discuss client and server roles, and already be familiar with Cisco Packet tracer simulation environment and download the latest version. There are instruction files as well as .pka activity files which gives step-by-step instructions for completing the activity.

Week 1 Discussion Questions

Discussion Question (DQ) 1: What do you think are some of the advantages and disadvantages of client server configurations of networks? How do you think a client-server configuration looks like in the HTM (Healthcare Technology Management) industry? [Minimum 200 words response for full credit]

Webinar Session (60 Minutes): The Week 1 webinar will include a course overview and instructions to improve the student's ability to access materials and resources. Students will be asked to introduce themselves and will be expected to actively participate throughout the session. The webinar session will discuss switch features and discuss the fundamental concepts of IPv4 and IPv6 and Cisco Packet tracer simulation environment and download the latest version. Students are encouraged to engage with the instructor during this dedicated time to go over Networking Devices and Initial Configuration in the Packet tracer simulator.

Week 1 Assignments

Assignment 1: Read the assigned article and answer the applicable questions.
Assignment 2: Complete a weekly quiz.
Assignment 3: Write a 200-word summary about the webinar for this week.
Assignment 4: Complete 4-6 modules within Networking Devices and Initial Configuration Cisco Packet Tracer.
Assignment 5: Complete Networking Devices and Initial Configuration Module 4 – 6 Module Assessment.

Time-on-Task

The Time-on-Task for this module is 18 hours.

WEEK 2/MODULE 2 (WAN Connectivity / Wireless Networking)

Learning Objective 2: Define and describe the operations and applications of Ethernet. Discuss cabling and the Gigabit Ethernet standards.	
TLO 1	Explain the characteristics of network topologies and network types.
TLO 2	Summarize the types of cables and connectors and explain which is the appropriate type for a solution.
TLO 3	Compare and contrast various devices, their features, and their appropriate placement on the network.
TLO 4	Demonstrate the ability to install and configure the appropriate wireless standards and technologies.
TLO 5	Explain the characteristics of network topologies and network types.
TLO 6	Explain wireless networking standards.
TLO 7	Describe the process for implementing Wi-Fi networks.

Module 2 Overview:

During week 2 students will describe WAN telephony technologies. Student will gain an understanding of the history behind network topologies and network types. Students will discuss the evolution of Ethernet and its effect on data sharing. Demonstrate the ability to install and configure the appropriate wireless standards and technologies. Students will be required to complete Module 13 - 16 in the Networking Essentials Cisco Packet tracer simulation environment. There are instruction files as well as .pka activity files which gives step-by-step instructions for completing the activity.

Week 2 Discussion Questions

Discussion Question (DQ) 1: Write a 200-word minimum discussing the distinct differences between wired and wireless technology? Do you think wireless is more or less secure (state why)? How are speed and security addressed in each of the 802.11 standards? For this discussion, we will stick to 802.11a, 11b, 11g, 11n, and 11ac. [Minimum 200 words response for full credit]

Webinar Session (60 Minutes): The week 2 webinar will be going WAN Connectivity and Wireless Networking. Students will learn about purposes and uses of ports and protocols, Explain the concepts and characteristics or routing and switching, Compare and contrast various devices, their features, and their appropriate placement on the network. Students are encouraged to engage with the instructor during this dedicated time to go over the assigned modules in the Packet tracer simulator.

Week 2 Assignments

Assignment 1: Read the assigned article and answer the applicable questions.
Assignment 2: Complete a weekly quiz.
Assignment 3: Write a 200-word summary about the webinar for this week.
Assignment 4: Complete Module 13 -16 (Build a Home Network - Configure Network and Device Security) in the Networking Essentials within Cisco Packet tracer simulation environment.
Assignment 5: Complete Networking Essentials Module 13 – 16 Module Assessment.

Time-on-Task

The Time-on-Task for this module is 18 hours.

WEEK 3/MODULE 3 (Virtualization and Cloud Computing / Data Centers)

Learning Objective 3: Student will define functions, operations, deployment, and maintenance of virtual and cloud networks. Describe network topologies and planning and design. Understand the components and functions of an ICS/SCADA system/networks. Describe classic data center architecture and design.	
TLO 1	Describe virtualization and cloud computing concepts
TLO 2	Explain virtual networking concepts
TLO 3	Summarize cloud concepts and connectivity options
TLO 4	Explain how network virtualization and cloud computing work in modern networks
TLO 5	Describe classic data center architecture and design
TLO 6	Explain high availability concepts and procedures

Module 3 Overview:

During week 3 students will describe virtualization and cloud computing concepts, explain virtual networking concepts, summarize cloud concepts and connectivity options. Summarize cloud concepts and connectivity Options. Explain basic corporate and datacenter network architecture. Explain basic corporate and datacenter network Architecture. Students will discuss virtualization and cloud computing and how they are connected and what are some uses and functions of both. Students will be required to complete multiple modules in the Networking Devices and Initial Configuration within Cisco Packet tracer simulation environment. There are instruction files as well as .pka activity files which gives step-by-step instructions for completing the activity.

Week 3 Discussion Questions

Discussion Question (DQ) 1: Discuss virtualization and cloud computing and how they are connected and what are some uses and functions of both? [Minimum 200 words response for full credit]

Webinar Session (60 Minutes): The week 3 webinar will be going over Virtualization & Cloud Computing and Data centers basics. Students will be able to summarize cloud concepts and their purposes and explain the purposes of virtualization and network storage technologies. Describe classic data center architecture and design. Explain high availability concepts and procedures. Students are encouraged to engage with the instructor during this dedicated time to go over the modules in the Packet tracer simulator.

Week 3 Assignments

Assignment 1: Read the assigned article and answer the applicable questions.
Assignment 2: Complete a weekly quiz.
Assignment 3: Write a 200-word minimum summary of the week three webinar.
Assignment 4: Complete Module 1 – 3 (Network Design - Number Systems) in the Networking Devices and Initial Configuration within Cisco Packet tracer simulation environment.
Assignment 5: Networking Devices and Initial Configuration Module 1 – 3 Checkpoint Exam.

Time-on-Task

The Time-on-Task for this module is 18 hours.

WEEK 4/MODULE 4 (Integrating Network Devices / Network Operations)

Learning Objective 4: Students will be knowledgeable in network routing, routing technologies as well as installation and configuration of a router.	
TLO 1	Explain the Internet of Things.
TLO 2	Describe unified communication features and functions.
TLO 3	Describe the function and major components of an ICS/SCADA network.
TLO 4	Describe the industry standards for risk management.
TLO 5	Discuss contingency planning.
TLO 6	Explain common security concepts.
TLO 7	Explain the purpose of organizational documents and policies.

Module 4 Overview:

During week 4 students will explain the Internet of Things, describe unified communication features and functions, describe the function and major components of an ICS/SCADA network, describe the industry standards for risk management. discuss contingency planning, explain common security concepts, explain the purpose of organizational documents and policies. Students will be required to complete module 7 - 9 within Networking Devices and Initial Configuration Cisco Packet tracer simulation environment. There are instruction files as well as .pka activity files which gives step-by-step instructions for completing the activity.

Week 4 Discussion Questions

Discussion Question (DQ) 1: Discuss some considerations with hardware or software changes? Why is it so critical to document changes and policies before and after changes? [Minimum 200 words response for full credit]

Webinar Session (60 Minutes): The week 4 webinar will include introduction to explain the Internet of Things, describe unified communication features and Functions, Describe the function and major components of an ICS/SCADA network. Additionally, students will engage in topics surrounding industry standards for risk management and discuss contingency planning. Students are encouraged to engage with the instructor during this dedicated time to go over the modules in the Packet tracer simulator.

Week 4 Assignments

Assignment 1: Read the assigned article and answer the applicable questions.
Assignment 2: Complete a weekly quiz.
Assignment 3: Write a 200-word minimum summary of the week four webinar.
Assignment 4: Complete Module 7 – 9 (Address Resolution - Transport Layer) in the Networking Devices and Initial Configuration within Cisco Packet tracer simulation environment.
Assignment 5: Networking Devices and Initial Configuration Module 7 - 9 Checkpoint Exam.

Time-on-Task

The Time-on-Task for this module is 18 hours.

WEEK 5/MODULE 5 (Network Naming / Securing TCP/IP)

Learning Objective 5: Students will define the functions and capabilities of a Domain Name Server (DNS). They will understand the methods and procedures for securing a TCP/IP network.	
TLO 1	Explain concepts of network security
TLO 2	Discuss common security threats in network computing
TLO 3	Describe methods for hardening a network against attacks
TLO 4	Explain how firewalls protect a network from threats
TLO 5	Describe network monitoring tools
TLO 6	Apply management and monitoring tools

Module 5 Overview:

During week 5 students will explain concepts of network security, discuss common security threats in network computing, discuss common vulnerabilities inherent in networking, describe methods for hardening a network against attacks, and explain how firewalls protect a network from threats. Students will discuss why is monitoring so important? What aspects of the network / users are being monitored and for what gain? Students will be required to complete multiple modules in the Networking Devices and Initial Configuration module within Cisco Packet tracer simulation environment. There are instruction files as well as .pka activity files which gives step-by-step instructions for completing the activity.

Week 5 Discussion Questions

Discussion Question (DQ) 1: Why is monitoring so important? What aspects of the network / users are being monitored and for what gain? [Minimum 200 words response for full credit]

Webinar Session (60 Minutes): The week 5 webinar will explain concepts of network security, discuss common security threats in network computing, discuss common vulnerabilities inherent in networking, describe methods for hardening a network against attacks, and explain how firewalls protect a network from threats. Additionally, students will learn how SNMP works and apply network monitoring tools. Students are encouraged to engage with the instructor during this dedicated time to go over the modules in the Packet tracer simulator.

Week 5 Assignments

Assignment 1: Read the assigned article and answer the applicable questions.
Assignment 2: Complete a weekly quiz.
Assignment 3: Write a 200-word minimum summary of the week five webinar.
Assignment 4: Complete Module 10 - 12 modules within Networking Devices and Initial Configuration within Cisco Packet tracer simulation environment.
Assignment 5: Networking Devices and Initial Configuration Module 10 - 12 Checkpoint Exam.

Time-on-Task

The Time-on-Task for this module is 18 hours.

WEEK 6 (Network Troubleshooting / Final Exam Week)

Learning Objective 6: Demonstrate proficiencies and knowledge retention over preview five weeks of instruction.	
TLO 1	Describe appropriate troubleshooting tools and their functions.
TLO 2	Analyze and discuss the troubleshooting process.
TLO 3	Resolve common network issues.
TLO 4	Summarize previous weeks knowledge.
TLO 5	Apply previous weeks knowledge into final practical.

Module 6 Overview:

During week 6 students will recall and summarize the previous five-week information. They will have to describe appropriate troubleshooting tools and their functions, analyze and discuss the troubleshooting process, resolve common network issues, summarize previous weeks knowledge and apply previous weeks knowledge into final practical. Students will discuss what they found interesting during the last 5 weeks. Students will be required to complete multiple modules in the Networking Essentials within Cisco Packet tracer simulation environment. There are instruction files as well as .pka activity files which gives step-by-step instructions for completing the activity.

Week 6 Discussion Questions

Discussion Question (DQ) 1: Discussion Question (DQ) 1 – What is something that you learned or found interesting during the last 5 weeks. What was interesting about the topic and how does it translate to the Bio-Medical profession? [Minimum 200 words response for full credit]

Webinar Session (60 Minutes): The week 6 webinar will recall and summarize the previous five-week information. They will have to explain the network troubleshooting methodology, troubleshoot common wired connectivity and performance issues, troubleshoot common network service issues, describe appropriate troubleshooting tools and their functions. Students are encouraged to engage with the instructor during this dedicated time to go over the modules in the Packet tracer simulator.

Week 6 Assignments

Assignment 1: Complete Final Exam.
Assignment 2: Write a 200-word minimum summary of the week six webinar.
Assignment 3: Module 17 -20 (Cisco Switches and Routers - Troubleshoot Common Network Problems) in the Networking Essentials within Cisco Packet tracer simulation environment Assignment 4. Modules 17 - 20: Introduction to Cisco Networking Group Exam.

Time-on-Task

The Time-on-Task for this module is 18 hours.

Course Grade Distribution

Discussion Board Requirements	**25%**
Weekly Webinars and Assignments	**30%**
Weekly Quizzes	**30%**
Final Exam	**15%**

Discussion Board Grading Criteria (25% of overall grade)

Students are required to respond to all weekly discussion board topics and instructor-directed prompts. Responses must be substantive and meet the minimum word count requirement. Additionally, students must engage with peers by responding to no fewer than two peer-to-peer responses per week. The following rubric is used as a guide by instructors to evaluate and grade student responses to discussion questions and peer-to-peer engagement:

	Beginning	Developing	Accomplished	Exemplary
	0-25 Points	25-50 Points	50-75 Points	75-100 Points
Weekly Discussion Question Responses (Minimum of two 200-word responses per week).	Contributes fewer than the required 2 Discussion Question (DQ) responses.	Contributes 2 Discussion Question (DQ) responses but one or both fail to meet minimum word-count requirements for the DQ.	Contributes by providing 2 Discussion Question (DQ) responses and meets the minimum word count requirements for the DQ.	Exceeds required DQ word count requirements and/or provides an exemplary response to a DQ.
Weekly Engagement with peers (Minimum of two 200-word responses to peers each week).	Contributes fewer than the required peer-to-peer responses in the discussion forum.	Contributes 2 peer-to-peer responses in the discussion forum but fails to meet minimum word-count requirements and lacks substance.	Contributes by providing 2 peer-to-peer responses and meets the minimum word count requirement for the peer-to-peer response.	Exceeds required peer-to-peer response requirements by meeting the minimum word count requirement and providing substantive responses to peers.
Quality and Content of DQ responses and peer-to-peer responses in the Discussion Forum.	Postings in the discussion forum are not relevant to the assigned topic, are inaccurate, or misrepresented.	Postings in the discussion forum address peripheral topics, are generally accurate, but may contain factual omissions and/or errors.	Postings are generally substantive; however, responses rely too heavily on opinion than fact. Postings meet word count requirements but lack scholarly tone or appropriate references.	Discussion Question and Peer-to-Peer postings consistently contribute to the discussion, contain substantive comments backed by relevant references and encourage open dialogue and additional discussion in the class.

Weekly Live Webinars (30% of overall grade)

Mandatory instructor-led webinars will be conducted at least once per week (60 Minutes). Webinars are not optional; however, we understand that from time-to-time students may not be able to attend in person. If you cannot attend a live session, the webinars will be posted in CANVAS for review. Instructors will assign weekly assignments associated with the live webinars.

Weekly Quizzes (30%)

Students will be assigned homework on a weekly basis. Homework may consist of a wide variety of deliverables. Quizzes are assigned in weeks one, two, and five. Worksheets are assigned in weeks two and four. Homework may include a wide array of requirements, ranging from written assignments, research projects, PowerPoint presentations, and a host of other activities. In all cases, instructors will endeavor to ensure that students possess a clear understanding of the requirements and expectations.

Exams (15%)

The course includes a midterm exam in week three and a final exam in week six. The exam format includes multiple choice, true or false questions, diagrams, and matching. An exam review will be conducted during the live webinar on weeks three and six.

Grading System for the College of Biomedical Equipment Technology

A	90-100	4.0	F	59 & Below	0.0
B	80-89	3.0	W	Withdrawal	N/A
C	70-79	2.0	I	Incomplete	N/A
D	60-69	1.0	T	Transfer	N/A

To receive an incomplete "I", the student must petition the instructor for an extension to complete the required coursework. The student must be able to pass the course with the completed work and garner a grade of 70 or better. Incomplete grades that are not completed within 7 business days after the beginning of the next session will be converted to the existing grade earned in the course and will affect the student's GPA accordingly. CBET reserves the right to extend the time needed to fulfill the incomplete.

An "I" does not count towards the Grade Point Average (GPA) until a grade is assigned. A "W" is given when a student is dropped from the roster during the course and does not replace the previous grade(s). Grades of "W" and "F" are recorded in the academic transcript and reflected in the GPA. When a course is repeated after failure or withdrawal, the later grade will replace the first grade in calculating the CGPA. The clock hours of the course repetition are counted toward the maximum timeframe. CBET shall record a grade of "incomplete" for a student who withdraws but is not entitled to a refund if the student requests the grade at the time the student withdraws, and the student withdraws for an appropriate reason unrelated to the student's academic status.

A student must repeat a course in which a grade of "F" was received. A student can repeat each course once, however, once they reach 1.5 times the length of time required for graduation, they will be dropped from the program. If a student fails any course a second time, he/she will be dropped from the program. A failed course will be rescheduled for the earliest possible module at the discretion of the Director of Education. Students will be charged to retake the course.

Additional Resources and Points of Contact

Students requiring additional administrative support are encouraged to contact the Colleges Student Advocate, Mrs. Terri Gomez, at 210.233.1102 or via e-mail at tgomez@cbet.edu

For a complete list of administrative policies and regulations refer to the CBET Catalog at https://cbet.edu/course-catalog

NOTE: THE INSTRUCTOR RESERVES THE RIGHT TO MODIFY THIS SYLLABUS and COURSE OUTLINE