

Washtenaw Community College Comprehensive Report

CST 185 Local and Mobile Networking Essentials Effective Term: Spring/Summer 2024

Course Cover

College: Business and Computer Technologies

Division: Business and Computer Technologies

Department: Computer Science & Information Technology

Discipline: Computer Systems Technology

Course Number: 185

Org Number: 13400

Full Course Title: Local and Mobile Networking Essentials

Transcript Title: Local/Mobile Network Essential

Is Consultation with other department(s) required: No

Publish in the Following: College Catalog , Time Schedule , Web Page

Reason for Submission: Course Change

Change Information:

Consultation with all departments affected by this course is required.

Course description

Pre-requisite, co-requisite, or enrollment restrictions

Outcomes/Assessment

Objectives/Evaluation

Rationale: Update course content and description to industry practice.

Proposed Start Semester: Winter 2024

Course Description: In this course, students learn basic networking concepts including the roles of various network devices, how they are connected and how they communicate. Students are introduced to concepts of peer-to-peer, client/server relationships, network topologies, media, network architectures, the open systems interconnection (OSI) and Transmission Control Protocol (TCP)/ Internet Protocol (IP) models, Ethernet, TCP/IP protocols, IPv4/IPv6, Media Access Control (MAC) addressing, routing, Network Address Translation (NAT), virtual private networks (VPNs), wireless technologies, wireless access points and security, Bluetooth, Near Field Communication (NFC), and Dedicated Short-Range Communication (DSRC). The course also provides a strong foundation towards preparation for the CompTIA Network+ Exam.

Course Credit Hours

Variable hours: No

Credits: 4

Lecture Hours: Instructor: 60 Student: 60

Lab: Instructor: 0 Student: 0

Clinical: Instructor: 0 Student: 0

Total Contact Hours: Instructor: 60 Student: 60

Repeatable for Credit: NO

Grading Methods: Letter Grades

Audit

Are lectures, labs, or clinicals offered as separate sections?: NO (same sections)

College-Level Reading and Writing

College-level Reading & Writing

College-Level Math

No Level Required

Requisites**Level II Prerequisite**

CST 160

General Education**General Education Area 7 - Computer and Information Literacy**

Assoc in Arts - Comp Lit

Assoc in Applied Sci - Comp Lit

Assoc in Science - Comp Lit

Request Course Transfer**Proposed For:**

Eastern Michigan University

Student Learning Outcomes

1. Distinguish and differentiate the main types of network topologies and how network appliances and end point systems make up a network.

Assessment 1

Assessment Tool: Outcome-related exam questions

Assessment Date: Fall 2024

Assessment Cycle: Every Three Years

Course section(s)/other population: All sections

Number students to be assessed: All students

How the assessment will be scored: Answer key

Standard of success to be used for this assessment: 70% of students will score 70% or higher.

Who will score and analyze the data: Departmental faculty

2. Identify the service and function of each layer of the OSI and TCP/IP models.

Assessment 1

Assessment Tool: Outcome-related exam questions

Assessment Date: Fall 2024

Assessment Cycle: Every Three Years

Course section(s)/other population: All sections

Number students to be assessed: All students

How the assessment will be scored: Answer key

Standard of success to be used for this assessment: 70% of students will score 70% or higher.

Who will score and analyze the data: Departmental faculty

3. Identify the role of each device in local and wide area networks, including routers, switches, servers, wireless access points, end-point systems and their respective cabling infrastructure.

Assessment 1

Assessment Tool: Outcome-related exam questions

Assessment Date: Fall 2024

Assessment Cycle: Every Three Years

Course section(s)/other population: All sections

Number students to be assessed: All students

How the assessment will be scored: Answer key

Standard of success to be used for this assessment: 70% of students will score 70% or higher.

Who will score and analyze the data: Departmental faculty

4. Demonstrate how to configure a client work station with IPv4 to function in a live network, how to subnet it and explain how it differs from IPv6.

Assessment 1

Assessment Tool: Outcome-related lab activity

Assessment Date: Fall 2024

Assessment Cycle: Every Three Years

Course section(s)/other population: All sections

Number students to be assessed: All students

How the assessment will be scored: Student achievement checklist

Standard of success to be used for this assessment: 70% of students will configure a client work station on a live network.

Who will score and analyze the data: Departmental faculty

5. Define the various aspects of wireless networking including the equipment and the protocols distinguishing their performance in a range of environments, including Ethernet, Fiber, wireless local area networks (LANs), Bluetooth, NFC, and DSRC.

Assessment 1

Assessment Tool: Outcome-related exam questions

Assessment Date: Fall 2024

Assessment Cycle: Every Three Years

Course section(s)/other population: All sections

Number students to be assessed: All students

How the assessment will be scored: Answer key

Standard of success to be used for this assessment: 70% of students will score 70% or higher.

Who will score and analyze the data: Departmental faculty

Course Objectives

1. Identify the various types of networks; LAN, wide-area network (WAN), metropolitan area network (MAN) and Enterprise.
2. Define the main purposes of networking, including sharing data, resources, etc.
3. List the differences between peer-to-peer networking and client server networking.
4. Identify various networking devices including Ethernet interfaces, switches, home modems, wireless access points and routers and explain the operation of each, contrasting the differences between their functionality.
5. Install, configure and test various network devices using wireless access points and home routers and switches.
6. Identify the various wired topologies used in networks, including bus, star, extended star, ring and mesh.
7. Identify the primary types of media cabling used with LANs including unshielded twisted pair (UTP), fiber optic, atmosphere, etc. and define the limitations of each, including crosstalk, overall length, etc.
8. Identify the seven layers of the OSI model, including the interfaces between the layers, and the virtual transmissions between layers on the sending and receiving machines.
9. Identify the Ethernet networking architecture, including its access method, collision control, contention, encapsulation and limitations.
10. Contrast the Carrier Sense Multiple Access/Collision Detection (CSMA/CD) and Carrier Sense Multiple Access/Collision Avoidance (CSMA/CA) access methods, and the importance of each in both wired and wireless networking.
11. Identify the frame structure used with Ethernet, explaining the parts, headers, trailers, etc. and the function each of these parts have in the transmission process.
12. Identify various networking protocols and explain the term, "protocol stack" and its relationship to the OSI model, using the TCP/IP protocol as an example.
13. Define the key characteristics of IP addressing, both IPv4 and IPv6, the classes, the importance of the subnet mask and gateway, etc., the hierarchical structure, methods of representation (decimal/binary) and the methods used to increase the number of available addresses (such as subnetting).

14. Demonstrate use of common commands to test and validate network services and communications.
15. Differentiate and contrast the various protocols within TCP/IP, (Domain Name System (DNS), Dynamic Host Configuration Protocol (DHCP), Telnet, Internet Control Message Protocol (ICMP), Address Resolution Protocol (ARP), VPN, TCP, IP etc.), defining the functions and parts of each within the stack.
16. Install, configure and utilize frame/packet capture programs, and use them to look inside the frame, to identify the various parts in real time.
17. Describe the difference between a LAN and a virtual local area network (VLAN).
18. Distinguish between the types of wireless networks and differentiate between their various speeds, distances, and applicability to different business situations.
19. Demonstrate how to install, configure, and test a simple LAN and subnet it using a switch, router, wireless access point, servers and client systems.
20. Identify various VPN configurations and configure client connections to VPN servers, and how wired and wireless security is implemented in each environment.
21. Identify the characteristics of alternate wireless connectivity protocols, including Bluetooth, NFC, and DSRC, including operating characteristics as well as inner communication compatibility with other networking devices.

New Resources for Course

Course Textbooks/Resources

Textbooks

CDTS. *Local and Wide Area Networking, Principles and Technologies*, 2nd ed. Lulu, 2023

Manuals

Periodicals

Software

Equipment/Facilities

Level III classroom

Computer workstations/lab

Data projector/computer

<u>Reviewer</u>	<u>Action</u>	<u>Date</u>
Faculty Preparer: <i>James Lewis</i>	<i>Faculty Preparer</i>	<i>Apr 28, 2023</i>
Department Chair/Area Director: <i>Scott Shaper</i>	<i>Recommend Approval</i>	<i>May 05, 2023</i>
Dean: <i>Eva Samulski</i>	<i>Recommend Approval</i>	<i>May 12, 2023</i>
Curriculum Committee Chair: <i>Randy Van Wagnen</i>	<i>Recommend Approval</i>	<i>Nov 14, 2023</i>
Assessment Committee Chair: <i>Jessica Hale</i>	<i>Recommend Approval</i>	<i>Nov 15, 2023</i>
Vice President for Instruction: <i>Brandon Tucker</i>	<i>Approve</i>	<i>Nov 17, 2023</i>

Washtenaw Community College Comprehensive Report

CST 185 Local and Mobile Networking Essentials Effective Term: Fall 2019

Course Cover

Division: Business and Computer Technologies

Department: Computer Instruction

Discipline: Computer Systems Technology

Course Number: 185

Org Number: 13400

Full Course Title: Local and Mobile Networking Essentials

Transcript Title: Local/Mobile Network Essential

Is Consultation with other department(s) required: No

Publish in the Following: College Catalog , Time Schedule , Web Page

Reason for Submission: Three Year Review / Assessment Report

Change Information:

Course discipline code & number

Course title

Course description

Outcomes/Assessment

Objectives/Evaluation

Other:

Rationale: 1. Course Number - This is considered the first course to be taken in networking, and therefore should be a "100" level course - it is a lead-in to the more advanced Cisco and Microsoft courses that are "200" Level courses. 2. Course Credit Hours - Credit Hours should match Contact Hours which are four contact hours per week. 3. Course Title - The networking concepts covered now are far more inclusive than just with the "PC" and therefore the title should be changed to reflect networking as a whole. 4. Modification of Outcome Requirements - the addition of Serial, Bluetooth, NFC, and DSRC communication altered a number of the Outcomes due to basically a total course rearrangement. 5. Objective Modification- because of the additional material added for Serial, Bluetooth, NFC, and DSRC, considerable rearrangement of the course (and therefore the Objectives) was necessary. This including combining Peer to Peer Communication and Client Server, combining Topology and Media, combining Ethernet Architecture and Ethernet Protocol, combining Packet Software labs using TCP/IP Protocols, and combining TCP/IP Applications lab projects. 6. Course Description - This was also changed as noted above, bringing in the new additional protocols.

Proposed Start Semester: Winter 2019

Course Description: Students learn basic networking concepts including building networks, connecting to a network and connecting networks. Included are peer-to-peer, client/server relationships, network topologies, media, architectures, the OSI model, Ethernet and TCP/IP protocols, IPv4/IPv6 and MAC addressing, routers/routing, network printing, NAT, VPN's, wireless, serial communication, Bluetooth, NFC, and DSRC. The course also provides a strong foundation in preparation for the CompTIA Network+ Exam. This course was previously CST 225.

Course Credit Hours

Variable hours: No

Credits: 4

Lecture Hours: Instructor: 60 **Student:** 60

Lab: Instructor: 0 **Student:** 0

Clinical: Instructor: 0 **Student:** 0

Total Contact Hours: Instructor: 60 Student: 60

Repeatable for Credit: NO

Grading Methods: Letter Grades

Audit

Are lectures, labs, or clinicals offered as separate sections?: NO (same sections)

College-Level Reading and Writing

College-level Reading & Writing

College-Level Math

No Level Required

Requisites

Level II Prerequisite

Basic computer skills with the Windows Operating System would be extremely helpful or completion of CIS 100.

General Education

General Education Area 7 - Computer and Information Literacy

Assoc in Arts - Comp Lit

Assoc in Applied Sci - Comp Lit

Assoc in Science - Comp Lit

Request Course Transfer

Proposed For:

Eastern Michigan University

Student Learning Outcomes

1. Distinguish and differentiate the main types of networks and network architecture by defining the layers of the OSI Model and identifying various types of point-to-point networking devices including network interface cards and switches.

Assessment 1

Assessment Tool: Written Exam specifically created for the assessment

Assessment Date: Fall 2021

Assessment Cycle: Every Three Years

Course section(s)/other population: All sections

Number students to be assessed: All students

How the assessment will be scored: Rubric: A written test will be given which will be a multiple choice exam with Questions/answers chosen from portions of the section tests given throughout the semester. The exam will be based on key concepts of the course objectives which make up each of the outcomes listed above. Tests will be blind-scored using a Scantron machine and results (right/wrong) for each question asked will be tabulated. A rubric will be used as a standard of the level of success in meeting those Outcomes and objectives that are listed in the syllabus. The test will be divided into sections, each identified with an outcome, and the questions in each section will address the objectives

Standard of success to be used for this assessment: Rubric Used: 1. Average of all students taking the test should equal or exceed 70% correct answers for all questions used in the assessment test. 2. 70% or greater of the number of students taking the assessment test should equal or exceed that 70% mark for all the question used in the assessment test. 3. Outcome Success: Average of all student scores for each particular outcome's part of the test should equal or exceed 70%.

Who will score and analyze the data: Instructors teaching the Networking course will blind-score the test and tabulate the results. These will be reviewed and matched with the above rubric and will be used as the standard of measurement during the analysis period. The instructors teaching/developing the course will make necessary analysis and changes based on the results.

2. Distinguish among the various types of networking topologies, various kinds of networking media and identify point-to-point networking architectures, protocols, and frame structure.

Assessment 1

Assessment Tool: Written Exam specifically created for the assessment

Assessment Date: Fall 2021

Assessment Cycle: Every Three Years

Course section(s)/other population: All sections

Number students to be assessed: All students

How the assessment will be scored: Rubric: A written test will be given which will be a multiple choice exam with Questions/answers chosen from portions of the section tests given throughout the semester. The exam will be based on key concepts of the course objectives which make up each of the outcomes listed above. Tests will be blind-scored using a Scantron machine and results (right/wrong) for each question asked will be tabulated. A rubric will be used as a standard of the level of success in meeting those Outcomes and objectives that are listed in the syllabus. The test will be divided into sections, each identified with an outcome, and the questions in each section will address the objectives

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Who will score and analyze the data: Instructors teaching the Networking course will blind-score the test and tabulate the results. These will be reviewed and matched with the above rubric and will be used as the standard of measurement during the analysis period. The instructors teaching/developing the course will make necessary analysis and changes based on the results.

3. Identify the characteristics of both peer-to-peer and client server networking and distinguish the characteristics of a Microsoft Active Directory environment.

Assessment 1

Assessment Tool: Written Exam specifically created for the assessment

Assessment Date: Fall 2021

Assessment Cycle: Every Three Years

Course section(s)/other population: All sections

Number students to be assessed: All students

How the assessment will be scored: Rubric: A written test will be given which will be a multiple choice exam with Questions/answers chosen from portions of the section tests given throughout the semester. The exam will be based on key concepts of the course objectives which make up each of the outcomes listed above. Tests will be blind-scored using a Scantron machine and results (right/wrong) for each question asked will be tabulated. A rubric will be used as a standard of the level of success in meeting those Outcomes and objectives that are listed in the syllabus. The test will be divided into sections, each identified with an outcome, and the questions in each section will address the objectives

Standard of success to be used for this assessment: Rubric Used: 1. Average of all students taking the test should equal or exceed 70% correct answers for all questions used in the assessment test. 2. 70% or greater of the number of students taking the assessment test should equal or exceed that 70% mark for all the question used in the assessment test. 3. Outcome

Success: Average of all student scores for each particular outcome's part of the test should equal or exceed 70%.

Who will score and analyze the data: Instructors teaching the Networking course will blind-score the test and tabulate the results. These will be reviewed and matched with the above rubric and will be used as the standard of measurement during the analysis period. The instructors teaching/developing the course will make necessary analysis and changes based on the results.

4. Identify and distinguish between the parts of the TCP/IP protocol stack, including various applications and define the concepts behind IPv4 and IPv6 addressing including routing, routers, network address translation and network printing.

Assessment 1

Assessment Tool: Written Exam specifically created for the assessment

Assessment Date: Fall 2021

Assessment Cycle: Every Three Years

Course section(s)/other population: All sections

Number students to be assessed: All students

How the assessment will be scored: Rubric: A written test will be given which will be a multiple choice exam with Questions/answers chosen from portions of the section tests given throughout the semester. The exam will be based on key concepts of the course objectives which make up each of the outcomes listed above. Tests will be blind-scored using a Scantron machine and results (right/wrong) for each question asked will be tabulated. A rubric will be used as a standard of the level of success in meeting those Outcomes and objectives that are listed in the syllabus. The test will be divided into sections, each identified with an outcome, and the questions in each section will address the objectives

Standard of success to be used for this assessment: Rubric Used: 1. Average of all students taking the test should equal or exceed 70% correct answers for all questions used in the assessment test. 2. 70% or greater of the number of students taking the assessment test should equal or exceed that 70% mark for all the question used in the assessment test. 3. Outcome Success: Average of all student scores for each particular outcome's part of the test should equal or exceed 70%.

Who will score and analyze the data: Instructors teaching the Networking course will blind-score the test and tabulate the results. These will be reviewed and matched with the above rubric and will be used as the standard of measurement during the analysis period. The instructors teaching/developing the course will make necessary analysis and changes based on the results.

5. Define the various aspects of wireless networking including the equipment and the protocols distinguishing the speed progressions, and identify other wireless technologies including Bluetooth, Near Field Communication, and Dedicated Short Range Communication.

Assessment 1

Assessment Tool: Written Exam specifically created for the assessment

Assessment Date: Fall 2021

Assessment Cycle: Every Three Years

Course section(s)/other population: All sections

Number students to be assessed: All students

How the assessment will be scored: Rubric: A written test will be given which will be a multiple choice exam with Questions/answers chosen from portions of the section tests given throughout the semester. The exam will be based on key concepts of the course objectives which make up each of the outcomes listed above. Tests will be blind-scored using a Scantron machine and results (right/wrong) for each question asked will be tabulated. A rubric will be used as a standard of the level of success in meeting those Outcomes and objectives that are listed in the syllabus. The test will be divided into sections, each identified with an outcome, and the questions in each section will address the objectives

Standard of success to be used for this assessment: Rubric Used: 1. Average of all students taking the test should equal or exceed 70% correct answers for all questions used in the assessment test. 2. 70% or greater of the number of students taking the assessment test should equal or exceed that 70% mark for all the question used in the assessment test. 3. Outcome Success: Average of all student scores for each particular outcome's part of the test should equal or exceed 70%.

Who will score and analyze the data: Instructors teaching the Networking course will blind-score the test and tabulate the results. These will be reviewed and matched with the above rubric and will be used as the standard of measurement during the analysis period. The instructors teaching/developing the course will make necessary analysis and changes based on the results.

Course Objectives

1. Identify the various types of networks; LAN, WAN, MAN, Enterprise, etc.
2. Define the main purposes of networking, including sharing data, resources, etc.
3. List the differences between peer-to-peer networking and client server networking.
4. Identify Windows networking components representing the server function and the client function.
5. Identify various networking devices including NICS, hubs, repeaters, switches, bridges, modems, wireless access points and routers and explain the operation of each, contrasting the differences between their functionality.
6. Identify computer resources (IRQ's, DMA channel, etc.), NIC card uses, explain the parallel to serial function, buffering techniques, bus mastering, and other characteristics.
7. Install, configure and test various network devices using modems, routers, switches, and hubs. Configure Windows networking properties, including network card installation and configuration.
8. Identify the various wired topologies used in today's networks, including bus, star, extended star, ring, mesh, etc.
9. Identify the primary types of media cabling used with LANs including UTP, fiber optic, atmosphere, etc. and define the limitations of each, including crosstalk, overall length, etc.
10. Identify the seven layers of the OSI model, including the interfaces between the layers, and the virtual transmissions between layers on the sending and receiving machines.
11. Identify the Ethernet networking architecture, including its access method, collision control, contention, encapsulation and limitations.
12. Contrast the CSMACD and CSMACA access methods, and the importance of each in both wired and wireless networking.
13. Contrast other types of networking architectures, including token passing, and the various types used with wireless, explaining the advantages/disadvantages of each.
14. Identify the frame structure used with Ethernet, explaining the parts, headers, trailers, etc. and the function each of these parts have in the transmission process.
15. Identify various networking protocols and explain the term, "protocol stack" and its relationship to the OSI model, using the TCP/IP protocol as an example.
16. Define the key characteristics of IP addressing, both IPv4 and IPv6, the classes, the importance of the subnet mask and gateway, etc., the hierarchical structure, methods of representation (decimal/binary) and the methods used to increase the number of available addresses (such as subnetting).
17. Identify a Windows "socket", its parts, and its importance in the session layer of the OSI model, and contrast the various protocol interfaces (NDIS, NetBIOS, TDI, etc.) and their function in making network protocols transparent to device drivers as well as applications.
18. Differentiate and contrast the various protocols within TCP/IP, (DNS, DHCP, Telnet, ICMP, ARP, VPN, TCP, IP etc.), defining the functions and parts of each within the stack.
19. Differentiate between frames, packets and segments, using encapsulation as the common thread.
20. Install, configure and utilize frame/packet capture programs, and use them to look inside the frame, to identify the various parts in real time.
21. Identify the configurations used with TCP/IP networks, including the use of non-subnetted and subnetted IP addresses, TCP/IP troubleshooting tools, and network packet software for observing the various characteristics of each TCP/IP protocol.

22. Distinguish between the types of wireless networks and differentiate between their various speeds, distances, and applicability to different business situations.
23. Install, configure, and test a number of different types of networks, including:
 - a simple LAN with hubs;
 - WAN/LAN networks, (including a three subnet/two router network with workstations at both ends), also with hubs/switches;
 - a 2nd WAN/LAN network, including a dial-up server, a client workstation, and null-modem serial connections with a terminal program;
 - a 3rd WAN/LAN network using a combination of wired and wireless machines with a router.
24. Define the types of network printing, showing proficiency in projects involving configuration of the different types for both local printing and network printing using a print server.
25. Identify various VPN configurations and configure client connections to VPN servers, differentiating the multiple connections created when using this type of encrypted transmission.
26. Identify the characteristics of alternate wireless connectivity protocols, including Bluetooth, Near Field Communication, and Dedicated short Range Communication, including operating characteristics as well as inner communication compatibility with other networking devices.

New Resources for Course

Course Textbooks/Resources

Textbooks

Meyers, Michael. *CompTIA Network +*, Seventh Edition ed. Chicago: McGraw Hill, 2018, ISBN: 1260122387.

Manuals

Periodicals

Software

Equipment/Facilities

Level III classroom

Computer workstations/lab

Data projector/computer

<u>Reviewer</u>	<u>Action</u>	<u>Date</u>
Faculty Preparer: <i>William Reichert</i>	<i>Faculty Preparer</i>	<i>Aug 28, 2018</i>
Department Chair/Area Director: <i>Philip Geyer</i>	<i>Recommend Approval</i>	<i>Sep 12, 2018</i>
Dean: <i>Eva Samulski</i>	<i>Recommend Approval</i>	<i>Sep 13, 2018</i>
Curriculum Committee Chair: <i>Lisa Veasey</i>	<i>Recommend Approval</i>	<i>Oct 11, 2018</i>
Assessment Committee Chair: <i>Shawn Deron</i>	<i>Recommend Approval</i>	<i>Oct 11, 2018</i>
Vice President for Instruction: <i>Kimberly Hurns</i>	<i>Approve</i>	<i>Oct 12, 2018</i>