I. INTRODUCTION

A. This course assists individuals in preparing for the Computing Technology Industry Association (CompTIA) Network+ certification exam and career as a network professional.

B. This course serves as a required or elective course on various degree plans. Curriculum plans for degrees and certificates are listed in the current Central Texas College catalog.

C. The delivery method of this course may be traditional lecture/lab, blended lecture/lab, or online.

D. Prerequisites: None

II. LEARNING OUTCOMES

Upon successful completion of this course, Network+, the student will be able to:

A. Identify and define terminology, hardware, and software components of computer networks (C3, C5, C15, C18)

B. Utilize equipment, protocols, and topologies to differentiate between various network systems (C1, C3, C5, C6, C8, C11, C13, C17, C18, C20)

C. Demonstrate skills in installing network hardware, software, and cables (C8, C17, C18, C19, F1, F7, F9, F12)

D. Troubleshoot network connectivity (C3, C8, C18, C19, C20, F7, F8, F11)

E. Configure network protocol (C5, C6, C8, C11, C15, C18, C19, F1, F8, F9)

F. Install and configure network client software (C5, C6, C8, C11, C15, C18, C19, F1, F8, F9)
III. INSTRUCTIONAL MATERIALS

A. The instructional materials identified for this course are viewable through www.ctcd.edu/books

B. Lecture Classes also require at least one USB storage device. Online students may use cloud based storage.

IV. COURSE REQUIREMENTS

A. Attend both lecture and lab or in the case of online delivery, be actively engaged in Blackboard and maintain constant progress.

B. Be prepared to participate in discussion, team projects/assignments and take unannounced assessments relating to the lecture materials.

C. Complete all exams/assessments.

D. Submit all assignments on time.

V. ASSESSMENTS

A. Student content mastery will be evaluated in the following areas:
   • Assessments (midterm exam, quizzes, projects, discussion etc.)
   • Final Assessment (final exam and/or semester project, participation)

B. Scheduled and unscheduled assessments will be given at the discretion of the instructor.

C. Exams/assessments may be composed of both subjective and objective questions plus computer output.

D. A student must take all exams/assessments. Both online and on campus students who know in advance that they will be absent due to school sponsored trips, military duty or orders, or any other valid reason, must arrange to take an early exam/assessment. Unexpected absences due to illness or other extenuating circumstances will require the student to contact the instructor about make-up work in lieu of the missed exam/assessment.

E. Students with unexcused absences will be given a zero for each missed assignment.
VI. SEMESTER GRADE COMPUTATION

<table>
<thead>
<tr>
<th>Course Requirements</th>
<th>Points</th>
<th>Points</th>
<th>Grade</th>
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<td>Assignments</td>
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<td>A-Superior</td>
<td>4</td>
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<tr>
<td>Assessments</td>
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<td>800-899</td>
<td>B-Above Average</td>
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<td>Final Assessment</td>
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<td>700-799</td>
<td>C-Average</td>
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<td></td>
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<td></td>
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<td>0 - 599</td>
<td>F-Failure</td>
<td>0</td>
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<td>TOTAL</td>
<td>1000</td>
<td>0 - 599</td>
<td>F-Failure</td>
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VII. NOTES AND ADDITIONAL INSTRUCTIONS FROM THE INSTRUCTOR

A. **Course Withdrawal:** It is the student’s responsibility to officially withdraw from a course if circumstances prevent attendance. Any student who desires to, or must, officially withdraw from a course after the first scheduled class meeting must file a Central Texas College Application for Withdrawal (CTC Form 59). The student must sign the withdrawal form.

CTC Form 59 will be accepted at any time prior to Friday of the 12th week of classes during the 16-week fall and spring semesters. The deadline for sessions of other lengths is:

- 10-week session: Friday of the 8th week
- 8-week session: Friday of the 6th week
- 5-week session: Friday of the 4th week

The equivalent date (75% of the semester) will be used for sessions of other lengths. The specific last day to withdraw is published each semester in the Schedule Bulletin.

For non-GoArmyEd active military students, the effective date of withdrawal is the filing date with the Education Center. For all other students, the effective date of withdrawal is the date that the withdrawal application is received by the Central Texas College representative.

Students who used financial aid, military tuition assistance, VA benefits, or other non-personal funds may be required to repay tuition and fees to the funding agency. For specific repayment requirements, contact the Office of Student Financial Aid or Veterans Services Office before withdrawing. Military tuition assistance students should visit their military Education Center or Navy College Office.

A student who officially withdraws will be awarded the grade of “W” provided the student’s attendance and academic performance are satisfactory at the time of official withdrawal. Students must file a withdrawal application with the College before they may be considered for withdrawal.
A student may not withdraw from a class for which the instructor has previously issued a grade of “F,” “FI,” “FN,” “IP,” or “XN.”

B. Instructor Initiated Withdrawals: Faculty are authorized to withdraw students who are not making satisfactory course progress to include failure to meet College attendance requirements as outlined in the section of the Catalog entitled “Satisfactory Progress Standards.” The instructor will assign the appropriate grade on CTC Form 59 for submission to the registrar.

Students enrolled in distance learning courses are expected to maintain constant progress throughout the course. Failure to do so may result in the student being administratively withdrawn by the instructor.

Students who have not attended class by the 12th class day of a 16-week course or the 6th class day of an 8-week term may be administratively withdrawn by the instructor with a grade of "W." Students may also be administratively withdrawn from any class when their absences exceed a total of four class meetings for a 16-week course or three class meetings for less than 16-week courses and; in the opinion of the instructor, the student cannot satisfactorily complete the course. In a distance learning course the last date of attendance is the last activity by the student in the course.

C. Administrative Withdrawal: A student may be administratively withdrawn by a designated member of the administrative staff of the College when the student has been placed on Academic Suspension or Disciplinary Suspension; the student has an outstanding financial obligation owed to the college; or the student registered for a course without the required prerequisite or departmental permission.

The College is under no obligation to refund tuition and fees, or other costs associated with an administrative or instructor initiated withdrawal.

D. Incomplete Grade: The College catalog states, “An incomplete grade may be given in those cases where the student has completed the majority of the coursework but, because of personal illness, death in the immediate family, or military orders, the student is unable to complete the requirements for a course...” Prior approval from the instructor is required before the grade of “IP” for Incomplete is recorded.

E. Cell Phones and Pagers: Students will silence cell phones and mobile devices while in the classroom or lab.

F. Americans with Disabilities Act (ADA): Disability Support Services provide services to students who have appropriate documentation of a disability. Students requiring accommodations for class are responsible for contacting the Office of Disability Support Services (DSS) located on the central campus.
service is available to all students, regardless of location. Review the website at www.ctcd.edu/disability-support for further information. Reasonable accommodations will be given in accordance with the federal and state laws through the DSS office.

G. **Instructor Discretion:** The instructor reserves the right of final decision in course requirements and may make changes to the course outline and/or assignments as needed.

H. **Civility:** Individuals are expected to be aware of what a constructive educational experience is and be respectful of those participating in a learning environment. Failure to do so can result in disciplinary action up to and including expulsion.

I. **Degree Progression:** Students who receive a grade of “D” are advised not to enroll in the next course for which this course was a prerequisite.

J. **Failing Grade:** The grade of “F” or “FN” will be given for academic failure, non-attendance or scholastic dishonesty.

K. **Scholastic Honesty:** All students are expected to maintain the highest standards of scholastic honesty in the preparation of all course work and during examinations. The college policy on scholastic honesty, including definitions on plagiarism, collusion, and cheating can be found at the following URL: http://online.ctcd.edu/plagiarism.cfm
VIII. COURSE OUTLINE

A. Lesson One:

1. Learning Outcomes: Upon successful completion of this lesson the student will be able to:
   a. List the advantages and describe specific uses of networked computing.
   b. Distinguish between client/server and peer-to-peer networks.
   c. Distinguish among the professional certifications.
   d. Identify standards-setting organizations for networking.
   e. Describe the purpose of the OSI model and each of its layers as required for the Network + certification examination.
   f. Describe the structure and purpose of data packets and frames.
   g. Explain basic data transmission concepts, including full duplexing, attenuation, latency, and noise.
   h. Categorize standard cable types and LAN technologies as required for the Network+ certification examination.
   i. Describe the uses for serial connector cables.
   j. Identify wiring standards and best practices in cabling.
   k. Explain the function of common networking protocols; commonly used TDP and UDP default ports; and SNMP as required for the Network+ certification examination.

2. Learning Activities:
   a. Participate in collaborative discussions based on the assigned reading materials. (C9,C12,C14,F1, F2, F5, F6)
   b. Complete assigned PC labs/simulations (C18, C19, C20, F8, F9, F11)
   c. Submit assigned papers and/or projects (C5, C6, C8, F1, F2, F7, F9, F11)

3. Unit Outline:
   a. Introduction to Networking
   b. Networking Standards and the OSI Model

B. Lesson Two:

1. Learning Outcomes: Upon successful completion of this lesson the student will be able to:
   a. Identify and explain the functions of the core TCP/IP protocols as required by the Network + certification examination
   b. Correlate the TCP/IP protocols to the layers of the OSI model
   c. Discuss addressing schemes for TCP/IP in IPv4 and IPv6 as required for the Network + certification examination
   d. Identify the ports for key TCP/IP services
   e. Describe common application layer TCP/IP protocols
   f. Compare and contrast basic and hybrid LAN physical topologies
   g. Categorize backbone structures of common LANs
h. Explain Ethernet transmission methods
i. Compare and contrast various types of data transmission switching
j. Explain the function of common networking protocols as required for the Network + certification examination.

2. **Learning Activities:**
a. Participate in collaborative discussions based on the assigned reading materials. (C9, C12, C14, F1, F2, F5, F6)
b. Complete assigned PC labs/simulations (C18, C19, C20, F8, F9, F11)
c. Submit assigned papers and/or projects (C5, C6, C8, F1, F2, F7, F9, F11)

3. **Unit Outline:**
a. Transmission basics and Networking Media
b. TCP/IP Protocols

C. **Lesson Three:**

1. **Learning Outcomes:** Upon successful completion of this lesson the student will be able to:
   a. Describe the functions of LAN connectivity hardware as required by the Network + certification examination.
   b. Demonstrate proficiency in installing and configuring network connection devices
   c. Compare, contrast, and categorize switching techniques includes VLAN management
   d. Describe the purposes and properties of routing, including IPv4 and IPv6 routing protocols

2. **Learning Activities:**
   a. Participate in collaborative discussions based on the assigned reading materials. (C9, C12, C14, F1, F2, F5, F6)
   b. Complete assigned PC labs/simulations (C18, C19, C20, F8, F9, F11)
   c. Submit assigned papers and/or projects (C5, C6, C8, F1, F2, F7, F9, F11)

3. **Unit Outline:**
   a. Topologies and Ethernet Standards
   b. Network Hardware

D. **Lesson Four:**

1. **Learning Outcomes:** Upon successful completion of this lesson the student will be able to:
   a. Explain how nodes exchange wireless signals
   b. Identify potential obstacles to wireless transmission, including interference and reflection.
c. Specify the characteristics of WLAN transmissions, including 802.11 a/b/g/n
d. Describe wireless MAN and WAN technologies, including 802.16 and satellite communications
e. Install and configure common network devices, including wireless access points
f. Troubleshoot connectivity issues and select appropriate solutions

2. **Learning Activities:**
   a. Participate in collaborative discussions based on the assigned reading materials. (C9, C12, C14, F1, F2, F5, F6)
   b. Complete assigned PC labs/simulations (C18, C19, C20, F8, F9, F11)
   c. Submit assigned papers and/or projects (C5, C6, C8, F1, F2, F7, F9, F11)

3. **Unit Outline:**
   a. WANs and Remote Connectivity
   b. Wireless Networking

E. **Lesson Five:**

1. **Learning Outcomes:** Upon successful completion of this lesson the student will be able to:
   a. Categorize Network Operating Systems (NOSs)
   b. Compare and contrast various NOSs and select appropriate NOS for network need
   c. Define the requirements for and features of various NOSs, including Windows Server 2008, UNIX, and Linux versions
   d. Create users and groups on a network, and assign permissions
   e. Define methods of network design unique to TCP/IP networks, including subnetting, CIDR, and address translation
   f. Differentiate between public and private TCP/IP networks
   g. Describe protocols used between mail clients and mail servers, including SMTP, POP3, and IMAP4
   h. Employ multiple TCP/IP utilities for network discovery and troubleshooting

2. **Learning Activities:**
   a. Participate in collaborative discussions based on the assigned reading materials. (C9, C12, C14, F1, F2, F5, F6)
   b. Complete assigned PC labs/simulations (C18, C19, C20, F8, F9, F11)
   c. Submit assigned papers and/or projects (C5, C6, C8, F1, F2, F7, F9, F11)

3. **Unit Outline:**
   a. Network Operating Systems
   b. TCP/IP Networking
F. **Lesson Six:**

1. **Learning Outcomes:** Upon successful completion of this lesson the student will be able to:
   a. Use terminology specific to converged networks
   b. Explain Voice over IP (VoIP) services and user interfaces
   c. Explain Video over IP services and their user interfaces
   d. Explain Quality of Service (QoS) assurance methods critical to converged network, including RSVP and DiffServ
   e. Identify security risks in LANs and WANs and design security policies that minimize risk
   f. Evaluate hardware- and design-based security techniques
   g. Compare and contrast methods of encryption such as SSL and IPSec for secure data storage and transit
   h. Computer and contrast popular authentications protocols such as RADIUS, TACACS, Kerberos, PAP, CHAP, and MS-CHAP.
   i. Employ network operating system techniques to provide basic security
   j. Compare, contrast, and evaluate wireless security protocols such as WEP, EPA, and 802.11i

2. **Learning Activities:**
   a. Participate in collaborative discussions based on the assigned reading materials. (C9,C12,C14,F1, F2, F5, F6)
   b. Complete assigned PC labs/simulations (C18, C19, C20, F8, F9, F11)
   c. Submit assigned papers and/or projects (C5, C6, C8, F1, F2, F7, F9, F11)

3. **Unit Outline:**
   a. Voice and Video over IP
   b. Network Security

G. **Lesson Seven:**

1. **Learning Outcomes:** Upon successful completion of this lesson the student will be able to:
   a. Devise an effective trouble shooting methodology
   b. Employ a systematic troubleshooting process to identify and resolve network problems
   c. Document symptoms, solutions, and results when troubleshooting network problems
   d. Employ a variety of software and hardware tools to diagnose problems
   e. Characterize network features and functions to keep data safe from loss or damage
   f. Protect and enterprise-wide network from viruses
   g. Compare and contrast network- and system-level fault-tolerance techniques
   h. Evaluate network backup and recovery strategies
i. Compile components of a useful disaster recovery plan

2. **Learning Activities:**
   a. Participate in collaborative discussions based on the assigned reading materials. (C9,C12,C14,F1, F2, F5, F6)
   b. Complete assigned PC labs/simulations (C18, C19, C20, F8, F9, F11)
   c. Submit assigned papers and/or projects (C5, C6, C8, F1, F2, F7, F9, F11)

3. **Unit Outline:**
   a. Troubleshooting Network Problems
   b. Ensuring Integrity and Availability

H. **Lesson Eight:**

1. **Learning Outcomes:** Upon successful completion of this lesson the student will be able to:
   a. Assess network management through documentation, baseline measurements, policies, and regulations
   b. Manage network performance using SNMP-based network management software, system and events logs, and traffic-shaping techniques
   c. Create a network assessment management system
   d. Plan and follow regular hardware and software maintenance routines

2. **Learning Activities:**
   a. Participate in collaborative discussions based on the assigned reading materials. (C9,C12,C14,F1, F2, F5, F6)
   b. Complete assigned PC labs/simulations (C18, C19, C20, F8, F9, F11)
   c. Submit assigned papers and/or projects (C5, C6, C8, F1, F2, F7, F9, F11)

3. **Unit Outline:**
   a. Network Management
   b. Network Planning