I. INTRODUCTION

A. Provides instruction in advance open-source Linux operating system. Develops directory services for clients, support users remotely, and install and configure network services.

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: ITSC 1316 (Linux Installation and Configuration).

II. LEARNING OUTCOMES

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

A. Install, administer, and manage advanced network environment using a Linux system. (C5, C6, C8, C15, C19, C20).

B. Demonstrate advanced skills and proficiency with Linux utilities and configurations. (C1, C5, C6, C8, C15, C19, C20).

C. Deploy secure networks. (C1, C5, C6, C8, C19, C20, F1, F3, F8, F9, F12).

D. Integrate Linux networks with existing networks. (C1, C5, C6, C8, C19, C20, F1, F3, F8, F9, F12).
III. INSTRUCTIONAL MATERIALS

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

B. Lecture Classes also require at least one USB storage device. (A spinning HDD with 30-60 GB storage is preferred).

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 COMPUTATIONS

<table>
<thead>
<tr>
<th>Course Requirements</th>
<th>Points</th>
<th>Points</th>
<th>Grade</th>
<th>Quality Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assignments</td>
<td>300</td>
<td>900-1000</td>
<td>A-Superior</td>
<td>4</td>
</tr>
<tr>
<td>Assessments</td>
<td>300</td>
<td>800-899</td>
<td>B-Above Average</td>
<td>3</td>
</tr>
<tr>
<td>Final Assessment</td>
<td>400</td>
<td>700-799</td>
<td>C-Average</td>
<td>2</td>
</tr>
<tr>
<td>TOTAL</td>
<td>1000</td>
<td>600 - 699</td>
<td>D-Passing, but unsatisfactory</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0 - 599</td>
<td>F-Failure</td>
<td>0</td>
</tr>
</tbody>
</table>

VII. NOTES AND ADDITIONAL INSTRUCTIONS FROM THE INSTRUCTOR

A. Information on the following Academic Policies, as described in the CTC Course Catalog will be followed:
   1. Withdrawals
   2. Grading
   3. Class Attendance and Course Progress
   4. Scholastic Honesty

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

C. 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. This 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.

D. 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.

E. 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.
VIII. COURSE OUTLINE

A. Lesson One: Security Threats to Linux and basic Components of Linux Security

1. Learning Outcomes: Upon successful completion of this unit the student will be able to:
   a. Describe the basics of security in an open source world.
   b. Explain the roles of Linux systems in an IT architecture.
   c. Differentiate between Linux and the operating environment which runs on top of Linux.
   d. Explain threats that can target Linux.
   e. Describe Linux security features, starting with the boot process.
   f. Define the basic security options for users, groups, and files.
   g. Configure basic security features for networks.
   h. Identify references and resources for latest security updates.
   i. List the timeline events for Linux Operating System Development.
   j. Define the criteria for comparing operating systems.
   k. List common applications and tools available within the Linux operating system distributions.

2. Learning Activities:
   a. Research and discuss the topics of the Lesson in class and in an online collaborative discussion forum (C7, C8, C9, C15, C18, F1, F9, F10, F13)
   b. Perform skills and functions in the section (C1, C5, C7, C8, C9, C16, C18, F1, F9, F10, F13)

3. Unit Outline: Follow the sequence of unit objectives.

B. Lesson Two: Configure Selected Linux Distribution and Assigning User Privileges

1. Learning Outcomes: Upon successful completion of this unit the student will be able to:
   a. Explain the criteria for selecting a specific Linux distribution.
   b. Identify the services available and configured on a Linux distribution.
   c. Configure network services based upon security criteria.
   d. Implement appropriate settings for common Linux services.
   e. Define and implement regular and special user permissions.
   f. Select correct fine grained controls for Linux security services.

2. Learning Activities:
   a. Research and discuss the topics of the Lesson in class and in an online collaborative discussion forum (C7, C8, C9, C15, C18, F1, F9, F10, F13)
   b. Perform skills and functions in the section (C1, C5, C7, C8, C9, C16, C18, F1, F9, F10, F13)
3. **Unit Outline:** Follow the sequence of the unit objectives.

C. **Lesson Three:** Filesystems, Encryption and Securing Services

1. **Learning Outcomes:** Upon successful completion of this unit the student will be able to:
   a. Configure secure Linux filesystems.
   b. Implement encryption within Linux files, folders or volumes.
   c. Define and assign Access Control List (ACL) permissions based upon security policies.
   d. Assign resource quotas for users.
   e. Install Linux distribution with minimal software resources and profile.
   f. Implement and enable appropriate Linux services for minimum footprint distribution.
   g. Deploy distribution with minimal profile of development tools.

2. **Learning Activities:**
   a. Research and discuss the topics of the Lesson in class and in an online collaborative discussion forum (C7, C8, C9, C15, C18, F1, F9, F10, F13)
   b. Perform skills and functions in the section (C1, C5, C7, C8, C9, C16, C18, F1, F9, F10, F13)

3. **Unit Outline:** Follow the sequence of the unit objectives

D. **Lesson Four:** Linux Networking and Networked Filesystems

1. **Learning Outcomes:** Upon successful completion of this unit the student will be able to:
   a. Manage common networking services on select TCP/UDP ports.
   b. Configure network services with protective TCP wrappers and firewall settings.
   c. Discuss the risks associated with alternative network connections.
   d. Deploy and configure SELinux and AppArmor distributions for an enhanced security posture.
   e. Implement secure shared networked filesystems.
   f. Implement SSH protocols to elevate security for remote access sessions.
   g. Discuss secure alternatives to cleartext remote access applications

2. **Learning Activities:**
   a. Research and discuss the topics of the Lesson in class and in an online collaborative discussion forum (C7, C8, C9, C15, C18, F1, F9, F10, F13)
   b. Perform skills and functions in the section (C1, C5, C7, C8, C9, C16, C18, F1, F9, F10, F13)
E. **Lesson Five: Application Security and Kernel Risk Mitigation**

1. **Learning Outcomes:** Upon successful completion of this unit the student will be able to:
   a. Regulate and manage access to Web servers and directory/name servers.
   b. Configure hardened profiles for common network utility services (NTP, FTP, etc.)
   c. Implement secure configuration for networked printers.
   d. Select best Linux kernel for defined security policies.
   e. Customize deployment options within the Linux kernel.
   f. Compile kernel source code, incorporating most current patches.

2. **Learning Activities:**
   a. Research and discuss the topics of the Lesson in class and in an online collaborative discussion forum (C7, C8, C9, C15, C18, F1, F9, F10, F13)
   b. Perform skills and functions in the section (C1, C5, C7, C8, C9, C16, C18, F1, F9, F10, F13)

3. **Outline:** Follow the sequence of the unit objectives

F. **Lesson Six: Managing Security Updates and Maintaining a Security Baseline**

1. **Learning Outcomes:** Upon successful completion of this unit the student will be able to:
   a. List recommended resources and “Best Practice” guides for remaining current in knowledge of Linux security issues.
   b. Select best Antivirus system given business and service requirements.
   c. Explain criteria for selection of Linux update management system.
   d. Create and maintain a secure baseline for the selected Linux distribution.
   e. Configure and screen logs to assess and characterize network traffic.
   f. Scan a system for integrity against malicious users.

2. **Learning Activities:**
   a. Research and discuss the topics of the Lesson in class and in an online collaborative discussion forum (C7, C8, C9, C15, C18, F1, F9, F10, F13)
   b. Perform skills and functions in the section (C1, C5, C7, C8, C9, C16, C18, F1, F9, F10, F13)

3. **Outline:** Follow the sequence of the unit objectives

G. **Lesson Seven: Testing, Reporting, and Responding to Security Breaches**
1. **Learning Outcomes:** Upon successful completion of this unit the student will be able to:
   a. Identify potential flaws within a given security configuration.
   b. Incorporate hardened tools in the use of bootable, read only systems.
   c. Manage and mitigate security issues on physical and virtual systems.
   d. Review given Linux distribution for changes in important configuration and security files.
   e. Identify and document typical system performance, establishing a user and network baseline.
   f. Monitor user behavior through login controls and log files.
   g. Respond correctly to a network or system security breach.
   h. Describe means to securely share information for confirmed security breach.

2. **Learning Activities:**
   a. Research and discuss the topics of the Lesson in class and in an online collaborative discussion forum (C7, C8, C9, C15, C18, F1, F9, F10, F13)
   b. Perform skills and functions in the section (C1, C5, C7, C8, C9, C16, C18, F1, F9, F10, F13)

3. **Unit Outline:** Follow the sequence of the unit objectives

H. Lesson Eight: Implementation of Best Practices and Implementation of Emerging Technologies

1. **Learning Outcomes:** Upon successful completion of this unit the student will be able to:
   a. Identify and incorporate “Best Practices” for keeping Linux software up to date.
   b. Select and incorporate recommendations from corporate and community support resources.
   c. Research new technologies and services and evaluate for appropriate implementation into deployed systems.

2. **Learning Activities:**
   a. Research and discuss the topics of the Lesson in class and in an online collaborative discussion forum (C7, C8, C9, C15, C18, F1, F9, F10, F13)
   b. Perform skills and functions in the section (C1, C5, C7, C8, C9, C16, C18, F1, F9, F10, F13)

3. **Outline:** Follow the sequence of the unit objectives