



CSIS-523: LINUX SYSTEM ADMINISTRATION (FORMERLY CSIS-223A)

Effective Term

Fall 2024

BOT Approval Date

11/09/2023

Discipline

CSIS - Computer Sci/Info Systems

Course Number

523

Course Title

Linux System Administration (formerly CSIS-223A)

Short Title

Linux System Admin

Credit Status (CB 04)

D - Credit - Degree applicable

Units**Lecture Units**

3.00

Total Units

3.00

Hours**Lecture Contact Hours**

48-54

Out of Class Hours Lecture

96-108

Total Contact Hours

48 - 54

Total Out of Class Hours

96 - 108

Total Student Learning Hours

144 - 162

Distance Education

Yes

Distance Education**Distance Education Type**

Both Fully Online and Hybrid Online

Fully Online Delivery Requirements:

a. Students must be notified via the college schedule of classes and the syllabus for the class if proctored tests are required for this course



b. Any planned face-to-face meetings, such as an orientation or study session, must be optional

c. The MSJC curriculum committee requires the use of accessible, asynchronous discussion as a component of every fully online course

Are you using publisher content?

No

Regular Substantive Interaction

Instructor-to-student, student-to-student, and student-to-content contact shall be distributed in a manner that will ensure regular substantive interaction (RSI) is maintained not only weekly but also for the duration of the course. Instructor interactions should be equivalent in time, quality and consistency to the engagement students would receive in a face-to-face course—for example, through announcements, discussion participation, personalized feedback, video messages, or other instructional communications. Instructors are expected to be responsive to student inquiries within a 24-72 hour time frame excluding holidays. RSI will be maintained through a variety of methods:

- Orientation - Students must be oriented to the online and face-to-face portions at the start of the course.
- Announcements - Announcements using the course management system must be posted at least weekly to keep students current on course events, due dates, materials, etc.
- Discussion Forums - Content-related discussion forums within the designated CMS will include appropriate instructor participation and will be initiated and maintained, with timely feedback provided. Instructors are required to monitor the discussions and related activities to provide guidance and direction. Open-ended discussion boards may be used to further learning and interaction.
- MSJC Communication – Instructor will use MSJC-administered communication tools (such as email or the designated CMS communication tools) to regularly communicate with and provide ease of access to students.
- Timely Feedback - Timely feedback on student work will be provided by the instructor, which may include comments and/or rubrics, within the Grades area of the designated CMS.
- Scheduled Meetings – Hybrid and synchronous courses will meet at regularly scheduled times. ADA Compliance - All course interactions and content must be designed with accessibility in mind and meet ADA requirements.

Catalog Description

This course provides a comprehensive introduction to Linux administration. Students will learn essential Linux concepts, installation and configuration, system maintenance, troubleshooting, and networking. The course will prepare students for the Linux+ certification exam, emphasizing practical skills and real-world scenarios. (formerly CSIS-223A)

Requisites

Recommended Preparation

Recommended Preparation (note that students can enroll in the class even if they haven't take the recommended course)

CSIS-581

Codes

TOP Code (CB 03)

0708.10* - *Computer Networking

CIP Code

11.0901 - Computer Systems Networking and Telecommunications.

Repeatability Code

No

Grading Option

Letter grade OR P/NP

GE Information

Check GE Types Requested

AA/AS D2 - Communication & Analytical Thinking

Learning Objectives

Learning Objectives

Learning Objective
1. Analyze the evolution and significance of Linux in conjunction with open source history.
2. Evaluate the interplay of essential networking and security concepts crucial for adept Linux administration.
3. Analyze and evaluate the core principles of Linux administration to synthesize a comprehensive understanding of its fundamentals.
4. Synthesize knowledge acquired from the installation, configuration, and maintenance of Linux systems to achieve mastery in their management.
5. Evaluate the appropriate kernel components for their alignment with specific hardware, hardware drivers, system resources, and requirements.
6. Critically evaluate the underlying systemic factors and biases contributing to the lack of diversity and the presence of discrimination, particularly against people of color, in the Linux and open-source communities.
7. Formulate and propose innovative, practical strategies designed to combat systemic biases and enhance DEI in the Linux and open-source realms.
8. Assess the historical context, consequences, and manifestations of these biases within the realm of technology and innovation.
9. Synthesize knowledge of Linux system structures to design advanced security protocols, focusing on the strategic creation of user and computer accounts.
10. Evaluate access lists and modify file permissions, then critically evaluate their effectiveness, performing necessary adjustments to ensure system integrity.

Learning Outcome Information

Course Learning Outcomes

Learning Outcome
1. Students will demonstrate a comprehensive understanding of Linux operating system's file system hierarchy and structure.
2. Students will create, modify, and delete user accounts and groups.
3. Students will demonstrate professional skills and ethical practices in Linux system administration.
4. Students will harden Linux systems against common security threats.

Program Learning Outcomes

Learning Outcome
Research and apply industry reference models and best practices in order to improve process designs.
Apply systems concepts in the investigation, evaluation, and resolution of information technology problems.

Institutional Learning Outcomes

Critical Thinking: The student will analyze problems, gather and synthesize relevant information, evaluate ideas, information, and evaluate alternative points of view to create, innovate and implement effective solutions.

Information and Technology Literacy: The student will access, interpret, evaluate, and apply relevant information sources and digital media effectively, and in an ethical and legal manner.

Content

Course Lecture Content

1. Introduction to Linux and Open Source Communities
 - a. History of Linux and its diverse contributors
 - b. Open source communities and their commitment to inclusion
 - c. The role of diversity in innovation and collaboration
2. Linux Installation and Configuration
 - a. Accessibility for users with disabilities
 - b. Internationalization and localization: supporting diverse languages and cultural settings
3. Linux file systems and storage.

- a. Create, manage, and maintain Linux file systems.
 - b. Configure and manage disk partitions and Logical Volume Manager (LVM).
 - c. Implement file system quotas and permissions.
4. Manage Linux user accounts and groups.
 - a. Create, modify, and delete user accounts and groups.
 - b. Configure and enforce password policies and user security.
 - c. Implement role-based access control and sudo privileges.
5. Linux networking and services.
 - a. Configure and manage network interfaces and IP addresses.
 - b. Implement and manage network services such as DNS, DHCP, and SSH.
 - c. Monitor and troubleshoot network connectivity issues.
6. Automate tasks using shell scripting and command-line tools.
 - a. Basic shell scripts to automate routine tasks.
 - b. Command-line tools for process management, file manipulation, and text processing.
7. Linux system security.
 - a. Implement firewall rules and access controls.
 - b. Harden Linux systems against common security threats.
 - c. Perform regular system audits and vulnerability assessments.
8. Monitor, optimize, and troubleshoot Linux systems.
 - a. Monitor system performance using various tools and utilities.
 - b. Troubleshoot common Linux system issues.
 - c. Optimize Linux system performance and resource usage.
9. Professional skills and ethical practices in Linux system administration.
 - a. Industry best practices in Linux system administration.
 - b. Ethical principles and legal requirements in the administration of Linux systems.
10. Linux Certification Preparation
11. Diverse representation in Linux certification and career pathways
12. Tips for overcoming barriers and promoting inclusivity in the tech industry

Methods of Instruction

Method

Lecture

Integration

In-class and online lectures will be conducted, covering essential topics in the Linux course. The lectures will be recorded with accessibility guidelines and made available for online students through the Course Management System (CMS). The presentations will include visuals, diagrams, and examples to ensure that students can grasp the concepts effectively.

DE Adaptations for MOI

DE Adaptations: Accessible Recorded lectures, PowerPoint presentations, and supplementary materials will be available for online students through the CMS. Accessible webinars and live-streamed lectures will be conducted to facilitate real-time interaction and discussions

Method

Lab Activities

Integration

Hands-on labs and practical exercises will be an integral part of the course. Students will gain experience working with Linux systems, including installation, configuration, and troubleshooting.

DE Adaptations for MOI

DE Adaptations: Virtual labs and remote desktop access will be provided for online students, allowing them to work on practical exercises and complete lab assignments from their own devices. Step-by-step guides and accessible video tutorials will be available to assist students in completing the tasks.



Method

Group Projects

Integration

Students will work in groups on projects related to Linux administration, promoting teamwork, and collaborative problem-solving skills.

DE Adaptations for MOI

DE Adaptations: Online students will be able to participate in group projects through collaboration tools such as Google Workspace, Microsoft Teams, or other platforms integrated into the CMS. Video conferencing tools will be used for group meetings and discussions.

Method

Discussion

Integration

Recognize and respect the global impact and contributions to Linux and open-source projects from communities around the world. Highlight international case studies and the influence of different cultures on the development of Linux. Incorporate real-world scenarios and case studies that reflect a broad range of cultural, socio-economic, and regional perspectives.

DE Adaptations for MOI

This will be done as a discussion board in the course Learning Management.

Methods of Evaluation**Method**

Quizzes

Integration

Short quizzes will be administered throughout the course to assess students' understanding of key concepts and topics. Quizzes will be integrated into the course content, ensuring that students are actively engaged with the material and can demonstrate their understanding of the concepts.

DE Adaptations for MOE

DE Adaptation: Online quizzes will be administered through the course management system, with a mix of multiple-choice, true/false, and short-answer questions. Immediate feedback will be provided to students to reinforce learning.

Method

Projects

Integration

Practical, hands-on assignments will be given to students, where they will be tasked with completing various Linux administration tasks and challenges. Assignments will be directly related to the course content, allowing students to apply their knowledge in real-world scenarios.

DE Adaptations for MOE

DE Adaptation: Assignments will be submitted through the course management system. Feedback and grading will be provided within five days of submission, with detailed comments on the student's work and suggestions for improvement.

Method

Class Performance

Integration

Employ a range of evaluation tools, such as quizzes, practical labs, group projects, and presentations, to cater to different strengths and learning styles. This ensures that students aren't pigeonholed based on one type of assessment. Provide clear and transparent grading rubrics for all assignments and exams. Ensure that these rubrics are designed with inclusivity in mind, focusing on objective criteria rather than potentially biased subjective judgments.

DE Adaptations for MOE

All assignments will be adopted for online course format via the Course management system taking the above guidelines into consideration.

Assignments**Assignment Type**

Writing

In-class and/or outside of class

In-class

Outside of class

Formative or Summative

Formative

Assignment

Throughout the course, complete a series of lab exercises that cover various Linux administration tasks. These exercises are designed to help students practice their skills, reinforce their understanding of course concepts, and prepare them for more complex assignments and projects.

Example Lab Exercise: Set up a simple web server using Apache on a Linux system. Configure the server to serve a basic HTML page, and ensure that the page is accessible from a web browser.

Grading and Feedback: Evaluate whether students have successfully completed the tasks as set out in the lab instructions. Assess the technical correctness of the solutions, ensuring commands and scripts are accurate and optimal. Recognize efforts in troubleshooting and problem-solving, even if the end result isn't entirely correct. Ensure that feedback is free of bias and respects all students' cultural, racial, and gender backgrounds. Feedback should be constructive and focused on the task, not the individual. Labs are graded within a week.

How assignment will be adapted in online format

Lab exercises will be provided as interactive, step-by-step instructions within the course management system. Complete the exercises using virtual machines or their own Linux systems, and submit screenshots or log files as evidence of completion. Instructors will provide feedback and guidance through the course management system, as well as during virtual office hours or live sessions.

Assignment Type

Writing

In-class and/or outside of class

In-class

Outside of class

Formative or Summative

Summative

Assignment

Complete a final project that demonstrates your understanding of Linux administration concepts and your ability to apply these concepts in a real-world scenario. The final project will involve designing, implementing, and managing a Linux-based system or network, and will require the integrate of various skills and knowledge gained throughout the course. Example Final Project: Design

and implement a Linux-based network infrastructure for a small business, including server configuration, user management, network services, and security measures. Document the setup process, the rationale behind design choices, and provide a user guide for the system.

Grading and Feedback: Evaluate the technical completeness and correctness of the Linux configurations, commands, scripts, or solutions proposed. Examine the quality of the project report, ensuring it's comprehensive, structured, and well-documented. For projects that require a presentation, evaluate clarity, confidence, and the ability to answer questions. Ensure that feedback is objective, unbiased, and recognizes the diverse backgrounds and perspectives students bring to their projects. The final Project will be graded by finals week.

How assignment will be adapted in online format

The final project will be submitted through the course management system, along with any supporting documentation and files. Students will be encouraged to collaborate and discuss their projects with their peers via discussion boards and video conferencing tools. Instructors will provide feedback and guidance during the project development process, and students will receive a comprehensive evaluation of their final submission, including feedback on both technical and documentation aspects.

Assignment Type

Reading

In-class and/or outside of class

Outside of class

Formative or Summative

Formative

Assignment

Background: The Linux and open-source communities have significantly advanced in fostering inclusivity and diversity. However, there have been documented instances of bias related to gender, race, and sexuality. Particularly, people of color often face unique challenges in these communities, stemming from both explicit and implicit biases. Such challenges might include underrepresentation, a lack of opportunities in leadership roles, limited access to vital resources or mentorship, and encounters with microaggressions or other discriminatory behaviors.

1. Analyze the potential reasons for such biases and their implications for the individuals involved and the community at large.
2. Propose actionable solutions that the Linux and open-source communities could adopt to further promote diversity and inclusivity, specifically addressing the challenges faced by people of color.
3. Reflect on the importance of diversity and inclusivity in tech communities and how biases can impact innovation, collaboration, and overall community growth

Reading: "Gender Bias in Open Source: Pull Request Acceptance of Women Versus Men" by Josh Terrell et al.

"Diversity in Open Source Is Even Worse Than in Tech Overall" by Klint Finley

Criteria for Evaluation: Grading and feedback by following criteria

1. Depth of analysis regarding the causes and implications of bias.
2. Feasibility and innovativeness of proposed solutions.
3. Clarity, coherence, and structure of the written assignment

How assignment will be adapted in online format

Here the assignment will be in the form of an online discussion board, students will have the opportunity to share their thoughts. The article will be available in the CMS (link or pdf) and the discussion board will be submitted via CMS. Feedback will be provided by grading the Discussion board via the CMS.

Course Materials

Textbooks

Linux+ and LPIC-1 Guide to Linux Certification | 6th Edition
Jason Eckert 2024: Print ISBN 9798214000800, eText ISBN



9798214000916

Other Resources

youtube, udemy, etc

Class Size Information**Class Size**

35

Class Size Category

B - Facilitated learning 35

Diversity and Inclusion**Explain how diversity and inclusion(e.g., gender, culture/race, sexuality, etc.) is infused into the course.**

Diversity and inclusion are infused into the Linux Administration course by incorporating various strategies to ensure that all students, regardless of their gender, culture, race, or sexual orientation, feel included and valued. By integrating diversity and inclusion throughout the Linux Administration course, students will not only develop their technical skills but also gain a deeper understanding of the importance of creating inclusive and equitable systems and networks in the professional world. For Example, The command line interface is a crucial component of Linux. The original command line, known as Bash, was developed by Brian Fox, an American computer scientist of African descent. Brian's creation of Unix Bash would later be incorporated into Linux by Linus Torvalds.

Describe how assignments, instruction, evaluation, course content, and interactions are contextualized for diverse learners promoting an equitable course.

Representation in course materials: The course content, including case studies, examples, and images, will feature diverse individuals and groups to promote a sense of belonging and representation. This ensures that students from all backgrounds can relate to the material and feel acknowledged. For example the course content includes following selections

- # History of Linux and its diverse contributors
- # Open source communities and their commitment to inclusion
- # The role of diversity in innovation and collaboration

Real-world scenarios: The assignments and projects within the course will emphasize real-world scenarios that involve diverse populations and contexts. This approach enables students to understand the importance of considering diversity and inclusion when designing and implementing Linux-based systems and networks.

Addressing bias and stereotypes: The course will discuss potential biases and stereotypes that may exist within the tech industry, particularly in the context of Linux administration. By acknowledging these issues, students can become more aware of their own biases and work towards creating a more inclusive and equitable environment in their professional lives.

Encouraging diverse perspectives: Group discussions, collaborative projects, and peer evaluations will be structured to encourage the sharing of diverse perspectives and experiences. This approach promotes open-mindedness, empathy, and a greater understanding of the importance of diversity and inclusion in the field of Linux administration.

Cultivating an inclusive learning environment: The instructor will establish a safe and supportive learning environment where students feel comfortable expressing their thoughts and ideas without fear of judgment or discrimination. This includes setting clear expectations for respectful communication, providing opportunities for anonymous feedback, and actively addressing any incidents of discrimination or bias that may arise during the course.

Interactions**Explain how the course will incorporate student-to-student interaction.**

a. Group projects: Throughout the course, students will be assigned group projects that require collaboration and problem-solving. This promotes student-to-student interaction and fosters a sense of community within the course.

b. In-class activities: During lectures, students will participate in small-group activities and discussions, providing opportunities for interaction and collaboration.

c. Discussion boards for Online setting: In addition to the instructor-led discussion boards, a "Student Lounge" discussion board will be created in the course management system where students can converse, share ideas, and support each other.CMS will put

students in random groups via the group setting. Wiki's, Blogs, and Journals inside the CMS will be used to provide a collaborative student-to-student interaction.

Explain how the course will incorporate instructor-to-student interaction.

a. Welcome letter and orientation video: At the beginning of the course, the instructor will send a welcome letter to students, providing an overview of the course, expectations, and resources. An orientation video will be included to help students navigate the course materials and become familiar with the course structure.

b. Weekly announcements: The instructor will use the course management system to post weekly announcements, highlighting important topics, concepts, and due dates.

c. Discussion boards: The instructor will create separate discussion boards for each unit of the course, enabling students to ask questions and seek clarification on course topics. The instructor will actively participate in these discussions, providing guidance and feedback.

d. Office hours and email support: The instructor will hold regular office hours for students to ask questions, seek clarification, or discuss course content in a one-on-one setting. Students are also encouraged to email the instructor with any questions or concerns they may have.

Explain how the course will incorporate student-to-content interaction.

a. Online lecture/lecture components: The course content will be delivered through online lectures /in-person that include interactive "test your knowledge" sections, offering students immediate feedback on their understanding of the material. The content will be presented with universal design and accessibility in mind.

b. Video shorts: A series of video shorts will be provided to reinforce key topics and concepts from the textbook and lectures. The Videos will have accessibility incorporated such as transcriptions.

c. Practice exams and problems: Students will have access to practice exams and problems to help them apply their knowledge and prepare for assessments.

Explain how the course will incorporate student-to-self interaction (metacognitive).

a. Self-assessment: Throughout the course, students will be encouraged to reflect on their learning progress and identify areas of strength and weakness. This self-assessment promotes metacognition and encourages students to take ownership of their learning journey.

b. Problem-solving strategies: Students will be encouraged to explore alternative problem-solving techniques and resources to expand their understanding and develop new perspectives on course content.

Key: 1079