CNIT R143: LINUX FUNDAMENTALS

Originator
ptrujillo

Co-Contributor(s)

Name(s)
Lynch , Alex (alynch)

College
Oxnard College

Discipline (CB01A)
CNIT - Computer Networking/IT

Course Number (CB01B)
R143

Course Title (CB02)
Linux Fundamentals

Banner/Short Title
Linux Fundamentals

Credit Type
Credit

Start Term
Fall 2023

Formerly
ENGT R143

Catalog Course Description
This course provides instruction and hands-on training on the fundamentals of the Linux operating system. Students will gain an understanding of an open-source operating system, perform a Linux installation, administer user accounts, configure file settings, and customize settings of the operating system. The course will also cover networking with Linux, the command-line interface, security issues, and interoperability with other operating systems. Also, this course prepares students for the Red Hat Linux System Administration I Certification.

Taxonomy of Programs (TOP) Code (CB03)
0708.10 - *Computer Networking

Course Credit Status (CB04)
D (Credit - Degree Applicable)

Course Transfer Status (CB05) (select one only)
B (Transferable to CSU only)

Course Basic Skills Status (CB08)
N - The Course is Not a Basic Skills Course

SAM Priority Code (CB09)
C - Clearly Occupational

Course Cooperative Work Experience Education Status (CB10)
N - Is Not Part of a Cooperative Work Experience Education Program

Course Classification Status (CB11)
Y - Credit Course

Educational Assistance Class Instruction (Approved Special Class) (CB13)
N - The Course is Not an Approved Special Class

Course Prior to Transfer Level (CB21)
Y - Not Applicable

Course Noncredit Category (CB22)
Y - Credit Course

Funding Agency Category (CB23)
Y - Not Applicable (Funding Not Used)

Course Program Status (CB24)
1 - Program Applicable

General Education Status (CB25)
Y - Not Applicable

Support Course Status (CB26)
N - Course is not a support course

Field trips
May be required

Faculty notes on field trips; include possible destinations or other pertinent information
A possible destination would be an IT shop or an IT managed service provider.

Grading method
(L) Letter Graded

Alternate grading methods
(E) Credit by exam, license, etc.

Does this course require an instructional materials fee?
No

Repeatable for Credit
No

Is this course part of a family?
No

Units and Hours

Carnegie Unit Override
No

In-Class

Lecture
Minimum Contact/In-Class Lecture Hours
43.75
Maximum Contact/In-Class Lecture Hours
43.75

Activity

Laboratory
Minimum Contact/In-Class Laboratory Hours
26.25

Maximum Contact/In-Class Laboratory Hours
26.25

Total in-Class

Total in-Class
Total Minimum Contact/In-Class Hours
70
Total Maximum Contact/In-Class Hours
70

Outside-of-Class

Internship/Cooperative Work Experience

Paid

Unpaid

Total Outside-of-Class

Total Outside-of-Class
Minimum Outside-of-Class Hours
87.5
Maximum Outside-of-Class Hours
87.5

Total Student Learning

Total Student Learning
Total Minimum Student Learning Hours
157.5
Total Maximum Student Learning Hours
157.5

Minimum Units (CB07)
3
Maximum Units (CB06)
3

Student Learning Outcomes (CSLOs)

	Upon satisfactory completion of the course, students will be able to:
1	Students will summarize the differences between Linux distributions, desktops, and presentation managers.
2	Students will demonstrate proper use of the tools for managing Linux and open source software maintenance.
3	Students will change command behavior using CLI switches, redirect output to a file, and use the output of one command as input to another which is called piping.

Course Objectives

	Upon satisfactory completion of the course, students will be able to:
1	Explain the difference between an open-source operating system and a proprietary operating system.
2	Analyze issues related to selecting an open-source operating system and list the issues related to providing support for the Linux operating system.
3	Install the Linux operating system and determine system requirements for installation.
4	Manage user accounts and the Linux file system.
5	Configure client network services and settings such as TCP/IP.
6	Define security terms and implement security settings in the Linux operating system.

7	Monitor system performance and document maintenance and troubleshooting.
8	Identify protocols that enable Linux to be interoperable with other operating systems.
9	Install the Linux operating system on a Raspberry Pi computing device.
10	Utilize the Raspberry Pi to create a solution to a specific problem such as a network-wide ad blocker or a Wi-Fi range extender.

Course Content

Lecture/Course Content

1. Open-source versus proprietary operating systems
   a. Popularity
   b. Licensing issues
   c. Costs
   d. Support Issues
2. Linux installation
   a. System resources and hardware requirements
   b. Installation methods
   c. Boot disk
   d. CD-ROM
   e. USB
   f. Network
   g. Optional installation parameters
   h. File system options
   i. Reiser
   j. Peripheral support and driver issues
3. Management
   a. File system management using command line utilities
      i. Fsck
      ii. Fdisk
      iii. Mkfs
   b. File system compatibility options with other operating systems
4. User account management
   a. Command line interface (CLI) management of file system and user accounts
   b. Graphic user interface (GUI) management of file system and user accounts
5. Network services
   a. TCP/IP settings
   b. Routing and subnetting
   c. Linux printing
   d. SAMBA and Apache
6. Security
   a. Linux Intrusion Detection System (IDS)
   b. Data security and encryption
   c. IP and port security
   d. Password policy and security
   e. Security auditing and logging
7. Documentation
   a. Baseline measurements
   b. Written procedures
   c. Installation
   d. Configuration
   e. Security
   f. Management
   g. Linux documentation resources and help files
   h. Best practices for recording trouble tickets
8. Raspberry Pi
   a. Assembling the Pi
   b. Linux OS options with the Pi

   c. Programming with the Pi
   d. Pi projects

Laboratory or Activity Content
 1. Install Linux OS on a Client
      a. Determine system resources needed
      b. Utilize a boot disk
      c. Install from a CD/DVD
      d. Install from USB
      e. Install from network
 2. Manage the File System
      a. Format the drive
      b. Configure the various EXT file systems
      c. Use the command line interface (CLI) to manage the file system
      d. Use the graphic user interface (GUI) to manage the file system
      e. Secure the file system
 3. Configure Network Services
      a. Configure IP address settings
      b. Configure TCP/IP settings
      c. Network Linux clients together to form a LAN
      d. Implement printing on a Linux network
 4. User Accounts
      a. Configure user accounts utilizing Linux
      b. Apply appropriate permissions for user accounts
      c. Implement a strong password policy for Linux user accounts
 5. Security
      a. Implement Linux intrusion detection system (IDS)
      b. Implement data security and encryption
      c. Reduce the attack surface by disabling non-essential ports and protocols.
      d. Update the Linux OS with the latest patches and drivers
      e. Analyze network communication utilizing a protocol analyzer
 6. Raspberry Pi
      a. Assembling the Pi
      b. Linux OS options with the Pi
      c. Programming with the Pi
      d. Pi projects

Methods of Evaluation

Which of these methods will students use to demonstrate proficiency in the subject matter of this course? (Check all that apply):

Written expression
Problem solving exercises
Skills demonstrations

Methods of Evaluation may include, but are not limited to, the following typical classroom assessment techniques/required assignments (check as many as are deemed appropriate):

Group projects
Individual projects
Laboratory activities
Laboratory reports
Objective exams
Oral presentations
Problem-solving exams
Quizzes
Reports/papers
Research papers
Skills tests or practical examinations
Essays
Projects
Problem-Solving Assignments

Instructional Methodology

Specify the methods of instruction that may be employed in this course

Audio-visual presentations
Class activities
Class discussions
Collaborative group work
Computer-aided presentations
Demonstrations
Distance Education
Field trips
Group discussions
Guest speakers
Instructor-guided use of technology
Internet research
Laboratory activities
Lecture

Describe specific examples of the methods the instructor will use:

1. Instructor will use publisher-provided PowerPoints to lecture on Red Hat Linux System Administration I topics.
2. The instructor will introduce Linux lab activities and demonstrate lab solutions when appropriate.
3. Small group research of current security threats to the Linux operating system and best practices to defend against specific threats. Students will report out to the class on their findings.
4. The instructor may illustrate to the class new features of specific versions of the Linux operating system such as Red Hat Linux and Kali Linux. Kali Linux is a special distribution for cybersecurity professionals.

Representative Course Assignments

Writing Assignments

1. Students are required to write reports on their analysis of articles they are assigned to read on the Internet on topics assigned by the instructor including new versions of Linux coming to the market and current security updates for the operating system.
2. Exam and/or quiz questions may require writing a critique such as explaining when one distribution of the Linux OS would be appropriate given a specific workplace scenario.

Critical Thinking Assignments

1. Evaluation of a cybersecurity vulnerability for the Linux OS and specific written recommendations to mitigate the risk.
2. Students will evaluate the technology needs of a fictitious company and determine a solution that best meets the needs of the customer. For example, a company is using Linux Ubuntu and the company has grown tremendously over the years and now they need to switch to a different version of Linux that will include structured support. The student will need to employ critical thinking in their recommendation based on research and analysis.

Reading Assignments

1. Students are required to read and study the information in the assigned chapter of the textbook in between classes in order to be prepared for the lecture and classroom activities. Examples of unit topics that students will be assigned to read are file system management, user and group administration, security, and troubleshooting of the Linux environment.
2. Students are required to perform reading from assigned Linux support websites such as www.redhat.co (http://www.redhat.com)m, www.ubuntu.com (http://www.ubuntu.com), www.kali.org, and www.suse.com (http://www.suse.com).

Skills Demonstrations

1. Students will capture a reference image of a Linux configuration using the appropriate software and then deploy that image to another PC.
2. Students will complete a Linux project that creates a solution to a specific problem and then demonstrate the solution to the class with a structured presentation. An example would be creating a configuration on a Linux based Raspberry Pi that blocks annoying Internet based ads for the entire network.

Problem-Solving and Other Assignments (if applicable)

1. Students will complete practice questions for the Red Hat Linux System Administration I certification.

Outside Assignments

Representative Outside Assignments
1. Read the assigned curriculum.
2. Complete labs that are embedded in the Red Hat Linux curriculum
3. Read Linux security blogs online and answer discussion questions in the course portal as it relates to Linux version security vulnerabilities and how to deal with risk.

Articulation

Comparable Courses within the VCCCD
CNSE M55 - Linux Networking and System Administration

Equivalent Courses at other CCCs

College	Course ID	Course Title	Units
Santa Barbara City College	CS 130	Introduction to the Linux Operating System	2.5

District General Education

A. Natural Sciences

B. Social and Behavioral Sciences

C. Humanities

D. Language and Rationality

E. Health and Physical Education/Kinesiology

F. Ethnic Studies/Gender Studies

CSU GE-Breadth

Area A: English Language Communication and Critical Thinking

Area B: Scientific Inquiry and Quantitative Reasoning

Area C: Arts and Humanities

Area D: Social Sciences

Area E: Lifelong Learning and Self-Development

Area F: Ethnic Studies

CSU Graduation Requirement in U.S. History, Constitution and American Ideals:

IGETC

Area 1: English Communication

Area 2A: Mathematical Concepts & Quantitative Reasoning

Area 3: Arts and Humanities

Area 4: Social and Behavioral Sciences

Area 5: Physical and Biological Sciences

Area 6: Languages Other than English (LOTE)

Textbooks and Lab Manuals

Resource Type
Textbook

Classic Textbook
No

Description
Red Hat Linux Academy, Linux System Administration I, November 2022 (The curriculum is continuously updated with the SaaS model)

Resource Type
Software

Description
Linux Operating System

Resource Type
Other Instructional Materials

Description
Raspberry Pi mini computer

Distance Education Addendum

Definitions

Distance Education Modalities
Hybrid (1%−50% online)
Hybrid (51%−99% online)
100% online

Faculty Certifications

Faculty assigned to teach Hybrid or Fully Online sections of this course will receive training in how to satisfy the Federal and state regulations governing regular effective/substantive contact for distance education. The training will include common elements in the district-supported learning management system (LMS), online teaching methods, regular effective/substantive contact, and best practices.
Yes

Faculty assigned to teach Hybrid or Fully Online sections of this course will meet with the EAC Alternate Media Specialist to ensure that the course content meets the required Federal and state accessibility standards for access by students with disabilities. Common areas for discussion include accessibility of PDF files, images, captioning of videos, Power Point presentations, math and scientific notation, and ensuring the use of style mark-up in Word documents.
Yes

Regular Effective/Substantive Contact

Hybrid (1%−50% online) Modality:

Method of Instruction	Document typical activities or assignments for each method of instruction
Asynchronous Dialog (e.g., discussion board)	Topics will be presented for discussion with the opportunity to provide commentary and feedback on fellow student responses.
E-mail	Email will be used for individual interaction between professor and student, to send group email reminders of deadlines, to inform of upcoming course content.
Face to Face (by student request; cannot be required)	Part of the course requires face to face time. Also, face to face with individuals will take place to discus specific questions, issues or concerns.
Video Conferencing	Zoom or comparable video conferencing software to lecture on course content, demonstrate lab assignments, answer student questions in real time, and provide student assistance on anything that is course related.
Other DE (e.g., recorded lectures)	Any real-time instruction will be recorded and available to students through the LMS.

Hybrid (51%−99% online) Modality:

Method of Instruction	Document typical activities or assignments for each method of instruction
Asynchronous Dialog (e.g., discussion board)	Topics will be presented for discussion with the opportunity to provide commentary and feedback on fellow student responses.
E-mail	Email will be used for individual interaction between professor and student, to send group email reminders of deadlines, to inform of upcoming course content.

Face to Face (by student request; cannot be required)	Part of the course requires face to face time. Also, face to face with individuals will take place to discus specific questions, issues or concerns.
Video Conferencing	Zoom or comparable video conferencing software to lecture on course content, demonstrate lab assignments, answer student questions in real time, and provide student assistance on anything that is course related.
Other DE (e.g., recorded lectures)	Any real-time instruction will be recorded and available to students through the LMS.

100% online Modality:

Method of Instruction	Document typical activities or assignments for each method of instruction
Asynchronous Dialog (e.g., discussion board)	Topics will be presented for discussion with the opportunity to provide commentary and feedback on fellow student responses.
E-mail	Email will be used for individual interaction between professor and student, to send group email reminders of deadlines, to inform of upcoming course content.
Video Conferencing	Zoom or comparable video conferencing software will be utilized to lecture on course content, demonstrate lab assignments, answer student questions in real time, and provide student assistance on anything that is course related.
Other DE (e.g., recorded lectures)	Any real-time instruction will be recorded and available to students through the LMS.

Examinations

Hybrid (1%–50% online) Modality
On campus
Online

Hybrid (51%–99% online) Modality
On campus
Online

Primary Minimum Qualification
COMPUTER INFORMATION SYS

Review and Approval Dates

Department Chair
11/16/2022

Dean
11/16/2022

Technical Review
11/23/2022

Curriculum Committee
11/23/2022

Curriculum Committee
12/14/2022

Control Number
CCC000543524

DOE/accreditation approval date
MM/DD/YYYY