Instructor:	Dr. Sean Burns
Office Address:	327 Little Library Building
Email:	sean.burns@uky.edu
Office Phone:	859-218-2296
Office Hours:	Tue, Thur: 2-4pm
Preferred Method of contact:	Email
	I usually respond to emails within 24 hours, or the first business day after the weekend or holiday.

Course Description

The course provides an introduction to the installation, administration, and maintenance of a Linux server within an information technology environment and for the purposes of providing user, email, web, and network services for an organization. Students will learn how to use the Linux command line and manage system users, install and configure new services and software, upgrade the system, and maintain good security policies. To take this course, students are required to own their own laptop or desktop (no more than five years old) and have full administration rights of their systems.

Student Learning Outcomes

After completing this course, students will be able to:
- evaluate and apply technology resources (Program Learning Outcome);
  - by installing, configuring, and managing a Linux server and relevant services and applications;
- understand the importance of maintaining a secure Linux server; and,
- communicate using multiple modes of communication (Program Learning Outcome).

Required Texts

Soyinka, W. (2016). *Linux administration: A beginner's guide* (7th ed.). New York: MacGraw Hill Education. ISBN: 978-0-07-184536-6

Course Activities and Assignments

This course is taught as a face to face course using a flipped classroom setup: the instructor will deliver short online lectures via Canvas, which students will view before each class. Class time will be devoted to demonstrations, projects, presentations, and discussions. It is expected that students will devote a considerable amount of time to study the materials before each class session.

Class Assignments: Assignments constitute 50% of the student's grade. There are nine assignments in this course. A short description of each assignment follows, and fuller descriptions will be delivered in class at least three weeks before the assignment's due date.

Class Participation: Class participation constitutes 35% of the student's grade. Students are expected to read all assigned material before each class, and participate fully in discussions, demonstrations, and projects in each class.

Group Project: The final group project constitutes 15% of the student's grade.

Summary Description of Course Assignments

Class Assignments

Assignment 1: Linux Installation: 9/01

Students will install and configure Fedora Server Linux or Ubuntu Server Linux using VirtualBox on their host system.

Assignment 2: Command Line Text Editor: 9/06

Students will demonstrate their ability to use a command line text editor.

Assignment 3: Software Management: 9/08

Students will demonstrate how to update the system and install/remove software.

Assignment 4: BASH Programming: 9/15

Students will write a BASH script that will create ten new user accounts.

Assignment 5: File Systems: 9/29

Students will create a logical volume for the /var directory and partition this volume.

Assignment 6: TCP/IP and Networking: 10/18

Students will write a 3-page essay explaining TCP/IP, networking, and DNS.

Assignment 7: Web Server: 10/27

Students will install and configure a PHP-enabled Apache web server.

Assignment 8: Email Server: 11/08

Students will install and configure Postfix and Dovecot to set up SMTP and IMAP.

Students will write a BASH script to encrypt, compress, and back up their home directory to a remote server.

Group Project

Students will form small groups to develop a plan to deploy and manage a Linux server in an IT setting. The final project will include an 8 page report and a 20 minute group presentation. Slides or other presentation material must be submitted with the assignment.

Course Grading

Grading Scale (No rounding)
- 90 – 100% = A
- 80 – 89% =   B
- 70 – 79% =   C
- 60 – 69% =   D
- Below 60% = E

Tentative Course Schedule

Week	Dates	Topic
Pre-Modules: Introduction to Course		
1	8/25	Course Overview and Q&A
Module 1: Introduction to Linux, Installation, and Software Management		
2	8/30, 9/01	Installing Linux & Virtualization
	9/01	*Assignment 1: Linux Installation*
3	9/06, 9/08	Using the Command Line and Managing Software
	9/06	*Assignment 2: Command Line Text Editor*
	9/08	*Assignment 3: Software Management*
Module 2: Single-Host Administration		
4	9/13, 9/15	Managing Users and the Boot Process
	9/15	*Assignment 4: BASH Programming*
5	9/20, 9/22	File Systems and Core Services
6	9/27, 9/29	The Linux Kernel and the Virtual File System

	9/29	*Assignment 5: File Systems*
Module 3: Networking and Security		
7	10/04, 10/06	TCP/IP and Network Configuration
8	10/11, 10/13	Firewalls and Security
	10/18	*Assignment 6: TCP/IP and Networking*
Module 4: Internet Services		
9	10/18, 10/20	DNS and FTP
10	10/25, 10/27	Web Server (Apache)
	10/27	*Assignment 7: Web Server*
11	11/01, 11/03	Email: SMTP, POP, and IMAP
	11/08	*Assignment 8: Email Server*
Module 5: Intranet Services		
12	11/08, 11/10	NFS and Samba
13	11/15, 11/17	LDAP and Printing
14	11/22, 11/29	DHCP & Backups
	11/29	*Assignment 9: Backing Up*
Post-Modules: Conclusion to Course		
15a	12/01	Presentations, Group Preparation
15b	12/06, 12/08	Presentations, Delivery

Final Exam Information

There is no final exam.

Mid-term Grade

Mid-term grades will be posted in myUK by the deadline established in the Academic Calendar:
http://www.uky.edu/registrar/calendar

Submission of Assignments

Course assignments will be uploaded via Canvas or handed in during class. If by Canvas, assignments are due by midnight of the due date noted on each assignment.

Work submitted after the due date will be penalized by 10 points each day the work is late. Work will not be accepted after three days past the due date.

Course Policies

Attendance Policy

This is a class whose success is dependent on everyone's participation. Also, there is a strong correlation between class attendance and grades. Therefore, attendance is vital for your achievement.

If you are absent on a day when an in-class assignment or an exam is given, you will be allowed to make-up that work *only* if the absence is **officially excused**. You will be asked to provide official written documentation for excused absences within one week of your return to class. If you do not turn in the written documentation on time, the absence will be counted as unexcused. Please see the definition of excused absences in the next section.

If you know ahead of time that you will be absent from class without an excused absence, please discuss this with your instructor and turn in any assignments ahead of time. Excuses for university-sponsored activities must be made *prior* to such absences. **For unexcused absences, no make-up work is available for in-class exercises, workshops, or exams unless approved in advance by your instructor**.

Students are expected to withdraw from the class if more than 20% of the classes scheduled for the semester are missed (excused or unexcused) per university policy.

Note: Please reference the definition of excused absence in the current edition of *Students Rights and Responsibilities* or on the web at http://www.uky.edu/StudentAffairs/Code/.

For any emergency situation that arises, **email your instructor** as soon as you know about the situation.

Excused Absences

Students need to notify the professor of absences prior to class when possible. S.R. 5.2.4.2 defines the following as acceptable reasons for excused absences: (a) serious illness, (b) illness or death of family member, (c) University-related trips, (d) major religious holidays, and (e) other circumstances found to fit "reasonable cause for nonattendance" by the professor.

Students anticipating an absence for a major religious holiday are responsible for notifying the instructor in writing of anticipated absences due to their observance of such holidays no later than the last day in the semester to add a class. Information regarding dates of major religious holidays may be obtained through the religious liaison, Mr. Jake Karnes (859-257-2754).

Per *Senate Rule 5.2.4.2*, students missing any graded work due to an excused absence are responsible: for informing the Instructor of Record about their excused absence within one week

following the period of the excused absence (except where prior notification is required); and for making up the missed work. The professor must give the student an opportunity to make up the work and/or the exams missed due to an excused absence, and shall do so, if feasible, during the semester in which the absence occurred.

Verification of Absences

Students may be asked to verify their absences in order for them to be considered excused. Senate Rule 5.2.4.2 states that faculty have the right to request "appropriate verification" when students claim an excused absence because of illness or death in the family. Appropriate notification of absences due to university-related trips is required prior to the absence.

Academic Integrity

Per University policy, students shall not plagiarize, cheat, or falsify or misuse academic records. Students are expected to adhere to University policy on cheating and plagiarism in all courses. The minimum penalty for a first offense is a zero on the assignment on which the offense occurred. If the offense is considered severe or the student has other academic offenses on their record, more serious penalties, up to suspension from the University may be imposed.

Plagiarism and cheating are serious breaches of academic conduct. Each student is advised to become familiar with the various forms of academic dishonesty as explained in the Code of Student Rights and Responsibilities. Complete information can be found at the following website: http://www.uky.edu/Ombud. A plea of ignorance is not acceptable as a defense against the charge of academic dishonesty. It is important that you review this information as all ideas borrowed from others need to be properly credited.

Senate Rules 6.3.1 (see http://www.uky.edu/Faculty/Senate/ for the current set of *Senate Rules*) states that all academic work, written or otherwise, submitted by students to their instructors or other academic supervisors, is expected to be the result of their own thought, research, or self-expression. In cases where students feel unsure about a question of plagiarism involving their work, they are obliged to consult their instructors on the matter before submission.

When students submit work purporting to be their own, but which in any way borrows ideas, organization, wording, or content from another source without appropriate acknowledgment of the fact, the students are guilty of plagiarism.

Plagiarism includes reproducing someone else's work (including, but not limited to a published article, a book, a website, computer code, or a paper from a friend) without clear attribution. Plagiarism also includes the practice of employing or allowing another person to alter or revise the work, which a student submits as his/her own, whoever that other person may be. Students may discuss assignments among themselves or with an instructor or tutor, but when the actual work is done, it must be done by the student, and the student alone.

When a student's assignment involves research in outside sources or information, the student must carefully acknowledge exactly what, where and how he/she has employed them. If the words of someone else are used, the student must put quotation marks around the passage in question and add an appropriate indication of its origin. Making simple changes while leaving the organization, content, and phraseology intact is plagiaristic. However, nothing in these Rules

shall apply to those ideas, which are so generally and freely circulated as to be a part of the public domain.

Please note: Any assignment you turn in may be submitted to an electronic database to check for plagiarism.

Accommodations Due to Disability

If you have a documented disability that requires academic accommodations, please see me as soon as possible during scheduled office hours. In order to receive accommodations in this course, you must provide me with a Letter of Accommodation from the Disability Resource Center (DRC). The DRC coordinates campus disability services available to students with disabilities. It is located on the corner of Rose Street and Huguelet Drive in the Multidisciplinary Science Building, Suite 407. You can reach them via phone at (859) 257-2754 and via email at drc@uky.edu. Their web address is http://www.uky.edu/StudentAffairs/DisabilityResourceCenter/.

Military Members and Veterans

We recognize the complexities of being a member of the military community and also a student. If you are a member of the military or a military veteran or dependent, please inform your instructor if you are in need of special accommodations. Drill schedules, calls to active duty, mandatory training exercises, complications with GI Bill disbursement, and other unforeseen military and veteran related developments can complicate your academic life. If you are aware of a complication, we will work with you and put you in contact with university staff members who are trained to assist you. Please contact the Coordinator of the University of Kentucky Veterans Resource Center at (859) 257-1148 for additional assistance. Visit http://www.uky.edu/veterans for more available resources.

Civility and Professionalism

Ideally the classroom environment should be supportive and comfortable. Do not equate a relaxed atmosphere with a lack of academic standards. You are expected to be on time for class, be prepared for class and conduct yourself appropriately for a respectful academic environment. For example, frequent tardiness demonstrates a lack of respect for others and violates the values of this learning community. If you are late for class, enter the classroom with as little disruption as possible. Similarly, if you must leave the class early, leave with as little disruption to the activity in the class as possible. In case you miss class, it is your responsibility to obtain class notes from your classmate(s).

Students must learn to meet the standards of professional behavior and treat each other with respect. Critical inquiry is important, but attacking other persons, verbally or otherwise, is not accepted. Students must learn to receive and act on constructive criticism, be reliable and responsible, polite and respectable of others, and focus on producing above quality work.

Important Notes
- Be sure to complete readings prior to the class meeting.
- You are responsible for all information, announcements, and changes addressed in classes and/or Canvas.

- The instructor reserves the right to alter the syllabus during the semester, if necessary.

Discussing Grades

Students who have grade or exam concerns must approach the professor during office hours, or through appointment. In order to give our full attention to grade issues, the professor will NOT discuss grades or exams before or after class. Once grades are posted online, you may visit the professor during office hours or by appointment to review your exam. Grades will not be discussed over email or the telephone.

I operate with the 24/7 rule. This means that, once you receive a graded assignment back, you must wait at least 24 hours to come and discuss it with me. I am more than happy to discuss grades with you, but ask that you take the time to thoroughly review the feedback provided beforehand and carefully compare your work with the assignment requirements and grading rubric. Students need to contact the professor for an appointment to discuss the issue and you must also come and talk to me within one week (7 days) of receiving the grade. Once that one-week period has passed, the grade will not be changed under any circumstances. Students must bring a written explanation of their dispute with them to this appointment. If the matter is still unresolved, students need to contact the Instructional Communication Coordinator. Students that do not fulfill these requirements will not be addressed and the original grades will be final.

Additional Student Resources

The Graham Office of Career Management is dedicated to assisting students in their career development process and employment success by working closely with employers who seek to hire world ready interns and graduates. More information can be found at http://gatton.uky.edu/career/.

Presentation U provides tutoring assistance and training with multimodal communication. UK students have the opportunity to attend scheduled workshops and work individually with highly trained faculty members, graduate students, and peer tutors. Located at the Hub in W. T. Young Library and on the first floor of Champions Court I, Presentation U can help with any of the following: brainstorming project topics, creating outlines, effectively using APA/MLA style, practicing oral presentations, designing and constructing effective visual aids, including PowerPoint, Prezi, websites, videos, and digital projects. Visit their website: www.uky.edu/presentationu or call (phone 859-218-5186) for our tutoring hours or to make an appointment.

The Writing Center is located in W. T. Young Library, Room 108B in the Hub (phone: 859-257-1368). The staff can help you identify and correct problems with your writing. You can also schedule an appointment online at: http://wrd.as.uky.edu/writing-center

Degree Information

Degree Progress Reviews: Upper-division students with 60 or more earned hours who have not already received a degree progress review from Suanne Early, Director of Student Affairs, are encouraged to schedule an appointment for Fall 2016. Appointments will be available beginning August 31, 2016. To schedule the appointment: 1) Start on the myInfo tab in myUK; 2) Click on the myAppointments link on the left side; 3) Choose Advising Department (College of Communication); 4) Choose Appointment Category (Degree Progress Review); 5) View the calendar and select an appointment time (options in BLUE). An email confirmation of your appointment will be sent to your UK email account. Failure to complete a degree progress review could result in delayed graduation.

Degree Applications: Students with 85 or more completed credit hours who intend to graduate in 2017 must apply for their degree using the myRecords tab in myUK. Click on the "Apply for Degree" link on the left side. Degree application deadlines are November 30 for a May degree, February 28 for an August degree, and June 30 for a December degree.

Course Calendar

Pre-Modules: Introduction to Course

Week 1: Course Overview and Q&A: 8/25
- Introductions / Technical-computer biographies
- Review syllabus
- Review Linux Mailing Lists and Websites

Module 1: Introduction to Linux, Installation, and Software Management

Week 2: Installing Linux & Virtualization: 8/30, 9/01
- Chapters 1-2, 30

Suggested Reading:
- Schroder, C. (2013, September 6). Five VirtualBox tips: How to install Linux and more. *Linux.com: News for the Open Source Professional*. Retrieved from https://www.linux.com/learn/5-virtualbox-tips-how-install-linux-and-more
- Bhartiya, S. (2015, August 10). Why, when, and how to use a virtual machine. *Linux.com: News for the Open Source Professional*. Retrieved from https://www.linux.com/learn/why-when-and-how-use-virtual-machine

Week 3: Using the Command Line and Managing Software: 9/06, 9/08
- Chapters 3-4

Suggested Reading: BASH
- Bourne-Again SHell Manual: https://www.gnu.org/software/bash/manual/
- BASH tips, guides:
  - Schroder, C. (2016). BASH tips for Linux Sysadmins. *Linux.com: News for the Open Source Professional*. Retrieved from https://www.linux.com/learn/bash-tips-linux-sysadmins

○ Brockmeier, J. (2010, January 8). BASH 101: Working at the CLI. *Linux.com: News for the Open Source Professional.* Retrieved from https://www.linux.com/learn/bash-101-working-cli
○ Brockmeier, J. (2010, January 18). BASH 201: Intermediate guide to BASH. *Linux.com: News for the Open Source Professional.* Retrieved from https://www.linux.com/learn/bash-201-intermediate-guide-bash
○ Brockmeier, J. (2010, February 8). Writing a simple BASH script. *Linux.com: News for the Open Source Professional.* Retrieved from https://www.linux.com/learn/writing-simple-bash-script
○ Brockmeier, J. (2010, October 21). Essentials of BASH scripting: Using loops. *Linux.com: News for the Open Source Professional.* Retrieved from https://www.linux.com/learn/essentials-bash-scripting-using-loops
○ Schroder, C. (2012, March 1). Unknown BASH tips and tricks for Linux. *Linux.com: News for the Open Source Professional.* Retrieved from https://www.linux.com/learn/unknown-bash-tips-and-tricks-linux

Suggested Reading: Package Management

● Bearnes, B. (2016, January 4). Package management basics: apt, yum, dnf, pkg. *DigitalOcean*. Retrieved from https://www.digitalocean.com/community/tutorials/package-management-basics-apt-yum-dnf-pkg

Module 2: Single-Host Administration

Week 4: Managing Users and the Boot Process: 9/13, 9/15
● Chapters 5-6
Week 5: File Systems and Core Services: 9/20, 9/22
● Chapters 7-8
Week 6: The Linux Kernel and the Virtual File System: 9/27, 9/29
● Chapters 9-10

Module 3: Networking and Security

Week 7: TCP/IP and Network Configuration: 10/04, 10/06
● Chapters 11-12

Suggested Reading:

● Dormon, B. (2016, May). How the internet works: Submarine fiber, brains in jars, and coaxial cables. *Ars Technica*. Retrieved from http://arstechnica.com/information-technology/2016/05/how-the-internet-works-submarine-cables-data-centres-last-mile/

Week 8: Firewalls and Security: 10/11, 10/13
● Chapters 13-15, 22

Suggested Reading:

● Firewall, *ufw* (Ubuntu): https://help.ubuntu.com/lts/serverguide/firewall.html

Module 4: Internet Services

Week 9: DNS and FTP: 10/18, 10/20
● Chapters 16-17

Week 10: Web server (Apache): 10/25, 10/27
- Chapter 18

Suggested Reading:
- Hutchinson, L. (2012, November). How to set up a safe and secure web server. *Ars Technica*. Retrieved from http://arstechnica.com/gadgets/2012/11/how-to-set-up-a-safe-and-secure-web-server/

Week 11: Email: SMTP, POP, and IMAP: 11/01, 11/03
- Chapters 19-20

Suggested Reading:
- Hutchinson, L. (2014, February). How to run your own e-mail server with your own domain, part 1. *Ars Technica*. Retrieved from http://arstechnica.com/information-technology/2014/02/how-to-run-your-own-e-mail-server-with-your-own-domain-part-1/
- Hutchinson, L. (2014, March). Taking e-mail back, part 2: Arming your server with Postfix and Dovecot. *Ars Technica*. Retrieved from http://arstechnica.com/information-technology/2014/03/taking-e-mail-back-part-2-arming-your-server-with-postfix-dovecot/
- Hutchinson, L. (2014, March). Taking e-mail back, part 3: Fortifying your box against spammers. *Ars Technica*. Retrieved from http://arstechnica.com/business/2014/03/taking-e-mail-back-part-3-fortifying-your-box-against-spammers/
- Hutchinson, L. (2014, April). Taking e-mail back, part 4: The finale, with webmail & everything after. *Ars Technica.* Retrieved from http://arstechnica.com/information-technology/2014/04/taking-e-mail-back-part-4-the-finale-with-webmail-everything-after/

Module 5: Intranet Services

Week 12: NFS and Samba: 11/08, 11/10
- Chapters 23-24

Week 13: LDAP and Printing: 11/15, 11/17
- Chapters 27-28

Week 14: DHCP & Backups: 11/22, 11/29
- Chapters 29, 31

Suggested Reading:
- Lonston, B. (2014, October 13). Introduction to RAID, concepts of RAID and RAID levels - parts 1-9. Retreived from http://www.tecmint.com/understanding-raid-setup-in-linux/
- Schroder, C. (2016, August 4). Managing encrypted backups in Linux: Part 1. *Linux.com: News for the Open Source Professional*. Retrieved from https://www.linux.com/learn/managing-encrypted-backups-linux-part-1
- Schroder, C. (2016, August 5). Managing encrypted backups in Linux: Part 2. *Linux.com: News for the Open Source Professional*. Retrieved from https://www.linux.com/learn/managing-encrypted-backups-linux-part-2

Post-Modules: Conclusion to Course

Week 15a: Presentations, Group Preparation: 12/01
Week 15b: Presentations, Delivery: 12/06, 12/08