**CpS 202 - ​​​​​​Information Technology II**

**(Linux Administration)**

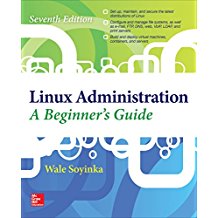
Spring 2023

|  |  |  |
| --- | --- | --- |
| Instructor: Dr. Alan Hughes | **Office:** | AL76; Alternatively, CS Lab MB203, Mack Building |
| **Office Hours:** | MWF 2pm; Th 10am by appointment  T electronic​ |
| **Email:** | [ahughes@bju.edu](mailto:ahughes@bju.edu) |
| **Telephone:** | Cell: 864-906-1024  Office: 864-242-4100 x 2274 |

**​Course Description**

An introduction to fundamental information technology concepts and troubleshooting. Problem-solving regarding installation and configuration of operating systems and common software applications with a focus on the Linux platform.

**Course Reading(s)**



Linux Administration, A Beginner's Guide - 7th Edition, by Wale Soyinka

ISBN-13: 978-0071845366 ISBN-10: 0071845364​

**​Context**

The faculty of the Computer Science department has aligned the computer science program with the goals of the Mathematical Sciences Division, BJU Bible and liberal arts core objectives, and the BJU institutional goals. The goal of the Computer Science department is to align all courses in the Computer Science and Information Technology majors to support one or more of the following departmental goals:

1. Design and implement solutions to practical problems.
2. Use appropriate technology as a tool to solve problems in various domains.
3. Create efficient solutions at the appropriate abstraction level.
4. Demonstrate an ability to work effectively in teams.
5. Demonstrate an ability to communicate technological information effectively both in written and oral forms.
6. Demonstrate an ability to acquire new knowledge in the computing discipline.
7. Demonstrate an understanding of social, professional and ethical considerations related to computing.
8. Demonstrate understanding of fundamental concepts in the student's discipline.
9. Prepare students for graduate school or to secure employment in a related area.

**Course Goals**

1. Design and implement solutions to practical problems.
2. Demonstrate an ability to work effectively in teams.
3. Demonstrate an ability to communicate technological information effectively both in written and oral forms.
4. Demonstrate an ability to acquire new knowledge in the computing discipline.
5. Demonstrate understanding of fundamental concepts in the discipline
6. Provide the student a platform for continued learning and development of his or her God-given abilities.
7. Instill in the student a desire to use his abilities in service to Christ.

**Learning Objectives**

At the end of the course, students should be able to:

|  |  |
| --- | --- |
| **Learning Objective​** | **Assessment Tools** |
| Install, configure, and understand the operational details of the Linux operating system. | Lab Projects, Quizzes, Tests​ |
| Understand the process of troubleshooting a user problem and be able to troubleshoot selected Linux operating system and application problems. | Lab Projects, Quizzes, Tests |
| Understand how to set up and troubleshoot a Linux network. | Lab Projects, Quizzes |
| Understand how to achieve interoperability between Linux and Windows. | Lab Projects, Quizzes |
| Effectively use workstation virtualization. | Lab Projects, Quizzes |

**Course Policies**

**Qualifications**

CpS201 is a pre-requisite for CpS 202.

**​​NOTE: An external hard drive or flash drive of at least 64GB is highly recommended for this class. 128GB is even better…..**

**Absences, lateness, and makeup opportunities**

1. For planned absences, please email me one week in advance.
2. Written assignments should be submitted before your planned absence.
3. Scheduled tests and quizzes should be taken before your planned absence; please contact me to make arrangements for doing so.
4. For absences due to incapacitating illness or emergency, you should contact me as soon as you are able to return to class in order to make arrangements for making up any graded work without penalty.
5. In other circumstances, tests and quizzes may be made up within one week of your return, with a 10 percent grade penalty for that test or quiz.
6. Leaving class early without prior arrangement will constitute an absence.

**Late Work**

1. Assignments must be submitted using the LMS by 11:59pm on the day due.
2. Only work missed for legitimate reasons may be made up without penalty.  Legitimate reasons include illness, a death in the family, or a BJU sanctioned tour.
3. You must make up late work according to the number of days missed - that is, missing one day of class gives you one extra day to turn in your work.
4. Any other late work will receive a 25% grade penalty.
5. All late work must be made up within one week in order to receive a non-zero grade. No lab submissions after the late date will receive any credit.

**​Grade appeals**

1. Grading appeals must be made by email only no later than one week after the grade was assigned.
2. Appeals will be automatically denied if the student attempts to make the appeal verbally.
3. Email grading appeals should be made respectfully and logically (My grade should be increased because.....).

**​Academic Integrity**

1. The overarching guide for academic integrity is the [BJU Academic Integrity Policy](http://home.bju.edu/academics/integrity.pdf).
2. Cheating on assignments and tests is a form of deception and stealing, and as such, is prohibited by Scripture and will incur academic penalties.
3. All work is to be done individually unless Dr. Hughes gives permission for group work.
4. In general students are encouraged to assist one another in the lab environment, *but must exercise care when seeking assistance while completing labs*.
5. **The goal is for each student to become familiar with Linux Administration, and be able to work effectively on his or her own. therefore, please do not copy work from another person, as this constitutes cheating.**

**Class Participation**

1. Compliance with student handbook policies is expected during class.
2. Class participation grades are based upon actively participating in lecture class discussions, working diligently on course assignments in lab classes and being respectful to the rest of the class and the instructor.
3. Class participation grade will include in-class assignments throughout the semester that will be individually graded.
4. Playing games, electronic messages, working on other subjects, etc. is a demonstration of disrespect for both the instructor and other students, and is not allowed during lecture and lab classes.

**Instructor Help outside of class**

You are encouraged to use email or the telephone to ask Dr. Hughes for assistance.

**Copyright Policy**

Copyright 2009-2022 Alan Hughes as to this syllabus and all lectures. Students are prohibited from selling (or being paid for taking) notes during the course to, or by any person, or commercial firm without the express written permission of the professor teaching the course.

**Schedule**

**(subject to modification during the semester as necessary – refer to Canvas for adjusted dates/assignments):**

|  |  |  |  |
| --- | --- | --- | --- |
| **Date** | **Day​** | **Class** | **Assignment Due​** |
| **Week 1** | | | |
| Jan 11 | W | Introduction; syllabus overview; BJU Online; Introduction to Linux Operating System | Chapter 1​  <https://www.youtube.com/watch?v=_gCwCOhMcog&index=1&list=PLD6B6473ACF32C59D> |
| Jan 12 | Th | Lab - VMWare, Lab 1 - Installing Ubuntu Linux | Chapter 2  **Be sure you have an ISO in hand for both Ubuntu and CentOS (on a flash drive or external drive is good); you can get Ubuntu at Ubuntu.com;**  **Read:**  <http://www.howstuffworks.com/operating-system.htm> |
| Jan 13 | F | Installing Ubuntu Linux as a Virtual Machine (VM) |  |
| **Week 2** | | | |
| Jan 16 | M | MLK, Jr Day – no class | Chapter 2; **Lab 1** |
| Jan 18 | W | Installing Linux as a Server |  |
| Jan 19 | Th | Installing Linux as a Server |  |
| Jan 20 | F | Installing Linux as a Server | **Quiz 1 – Chapter 1&2** |
| **Week 3** | | | |
| Jan 23 | M | Managing Software – Red Hat Package Manager (RPM) | Chapter 3; **Lab 2**  Installing software with RPM and yum: <https://youtu.be/pPRLLcF7KRU> |
| Jan 25 | W | Managing Software – Ubuntu/Debian apt | Chapter 3  Installing Software with Apt (apt-get): <https://www.youtube.com/watch?v=EKmLXiA4zaQ> |
| Jan 26 | Th | Lab | ​ICE: managing software with RH and Ubuntu |
| Jan 27 | ​F | Managing Software |  |
| **Week 4** | | | |
| Jan 30 | M | Managing Users and Groups | Chapter 4; **Lab 3**  Users, Groups, Permissions: <https://www.youtube.com/watch?v=zRw0SKaXSfI> |
| Feb 1 | W | Managing Users and Groups | ICE: Managing Users and groups |
| Feb 2 | Th | Lab Day |  |
| Feb 3 | ​F | Managing Users and Groups |  |
| **Week 5** | | | |
| Feb 6 | M | Creating and editing files with text editors | Chapter 5; **Lab 4** |
| Feb 8 | W | Bash Scripting |  |
| Feb 9 | Th | Lab Day |  |
| Feb 10 | F | Bash Scripting | **Review for Test 1** |
| **Week 6** | | | |
| Feb 13 | M | Test 1 | **Test 1** |
| Feb 15 | W | Bible Conference |  |
| Feb 16 | Th | Bible Conference |  |
| Feb 17 | F | Bible Conference |  |
| **Week 7** | | | |
| Feb 20 | M | **Test 1 – Chapters 1-5** | **Test 1: Chapters 1-5** |
| Feb 22 | W | Miscellaneous tools (du, df, sync, ps, top, kill, uname, who, w, su) |  |
| Feb 23 | Th | Lab Day - shell scripting | ​ |
| Feb 24 | F | Creating Shell Scripts and Displaying File Contents | ​ |
| **Week 8** | | | |
| Feb 27 | M | Booting and Shutting Down (GRUB, Bootstrapping; init; Scripts; enabling/disabling services; graphical svc mgrs.) | Chapter 6-7; Lab 5  Linux Boot Process: <https://youtu.be/ZtVpz5VWjAs> |
| Mar 1 | W | File Systems | Chapter 7  Linux File System/Structure: <https://youtu.be/HbgzrKJvDRw>  Linux File Systems Explained: <https://youtu.be/2qQTXp4rBEE>  Linux File Systems Complete Overview: <https://youtu.be/roES8iAaJEM>  Linux Directory Structure with Examples: <http://www.thegeekstuff.com/2010/09/linux-file-system-structure/> |
| Mar 2 | Th | Lab Day | **ICE:** adding disk; mounting disk; creating partitions and logical volumes |
| Mar 3 | F | **Lab Test 1** |  |
| **Week 9** | | | |
| Mar 6 | M | Core System Services (init, upstart, xinetd, inetd, rsyslogd, crontab) | Chapter 8-9; Lab 6  Start, Stop, Restart services: <https://youtu.be/8JqxRLHGalI> |
| Mar 8 | W | The Linux Kernel | Chapter 9 |
| Mar 9 | Th | Lab Day | ​ |
| Mar 10 | F | Lab Catch-up Day | **Quiz 7 – Chapters 8-9** |
| **Week 10** | | | |
| Mar 13 | M | TCP/IP for SysAdmins  Layers, TCP/IP model vs OSI model | Chapter 11-12; **Lab 7**  Linux Network Configuration: <https://www.youtube.com/watch?v=PEa1xopeufQ&list=PLD6B6473ACF32C59D&index=7> |
| Mar 15 | W | IPv4, TCP; UDP; Hosts and Networks; subnetting; routing | ​Complete Linux Networking Tutorial: <https://www.youtube.com/watch?v=fHgk7aDGn_4> |
| Mar 16 | Th | Lab Day | ​ICE: configure TCP/IP on your Linux VM |
| Mar 17 | F | Lab Day: Configuring IP and connecting in the lab | **Quiz 8 – Chapter 11** |
| **Week 11 Spring Break All Week Mar 20-24** | | | |
| **Week 12** | | | |
| Mar 27 | M | Configuring Networking (cont'd) | Chapter 12 |
| Mar 29 | W | Ifconfig; managing routes; Linux Firewall (netfilter/ufw) | Chapter 12  Linux Firewalls: <https://www.youtube.com/watch?v=foJHBZoEprE&index=9&list=PLjGbUPQu3fSTgQoGV3wHxxRqYca7y2KFD>  Linux Security Tools: <https://youtu.be/Qp31GYfxbA0?list=PLjGbUPQu3fSTgQoGV3wHxxRqYca7y2KFD> |
| Mar 30 | Th | Lab Day | ​ICE: configure an email server (postfix) |
| Mar 31 | F | Networking (cont'd) | **Quiz 9 - Chapters 11-13**  Cybersecurity with Linux: <https://www.youtube.com/watch?v=M48naKSLvNs> |
| **Week 13** | | | |
| Apr 3 | M | Local Security | Chapter 14-15; **Lab 8**  Linux Malware and Securing Your System: <https://youtu.be/V-GYYrsNNSM>  Securing Ubuntu Linux: <https://youtu.be/JVxkTqLoyGY>  How to Install Network Security and Penetration Tools on Ubuntu: <https://youtu.be/5MCSLau4pf4> |
| Apr 5 | W | Network Security | ​Chapter 15  Defend Your Ubuntu System Against Network Attacks: <https://youtu.be/2IosbILbMWQ>  Hardening Linux: <https://www.youtube.com/watch?v=CmBiNjCoDFk&list=PLjGbUPQu3fSTgQoGV3wHxxRqYca7y2KFD&index=8> |
| Apr 6 | Th | Lab Day | ​ICE: Wireshark/tcpdump;nmap;snort  Wireshark Tutorial: <https://youtu.be/Yo8zGbCbqd0>  Snort (NIDS): <https://youtu.be/iBsGSsbDMyw> |
| Apr 7 | F | Lab Day | ICE (cont'd):​Wireshark/tcpdump;nmap;snort  **Quiz 10 – Chapter 14-15** |
| **Week 14** | | | |
| Apr 10 | M | Domain Name System (DNS)  hosts file; How DNS works | ​Chapter 16; **Lab 9** |
| Apr 12 | W | Install DNS | ​Install and set up Bind9 on Ubuntu 16.04: <https://youtu.be/SATEOZwjw4U> |
| Apr 13 | Th | Lab Day: Configure DNS | ​ICE: Install DNS (bind9)  BIND install and configure: <https://youtu.be/-r5A-H5nxcA> |
| Apr 14 | F | Lab Day: DNS (cont'd) | **Quiz 11 – Chapter 16** |
| **Week 15** | | | |
| Apr 17 | M | FTP | Chapter 17; **Lab 10**  **ICE: FTP Exercise**  Linux FTP Server Setup: <https://youtu.be/TyqwwAzwLuM> |
| Apr 19 | W | Apache Web Server | Chapter 18  How to Install and run Apache Web Server in Ubuntu: <https://youtu.be/-q8Jj4aAWYw> |
| Apr 20 | Th | Lab Day | ​Work on Lab |
| Apr 21 | F | Lab Day | ​Work on Lab  **Quiz 12 – Chapter 17-18** |
| **Week 16** | | | |
| Apr 24 | M | Simple Mail Transfer Protocol (SMTP/Postfix) | Chapter 19; **Lab 11**  Configure Postfix: <https://youtu.be/Zqg-t3iJKKU> |
| Apr 26 | W | SMTP; Postfix |  |
| Apr 27 | Th | Lab Day |  |
| Apr 28 | F | Postfix (cont'd) | **Quiz 13 – Chapters 18-19** |
| **Week 17** | | | |
| May 1 | M | Using SaMBa for interoperating Linux and Windows | Chapter 24; **Lab 12**  Configuring Windows/Linux File Sharing with SaMBa: <https://www.youtube.com/watch?v=zTujwRSsIBw> |
| May 3 | W | Using SaMBa for interoperating Linux and Windows | Chapter 24  ICE: installing SaMBa  <https://www.youtube.com/watch?v=x8Lo20C19ao> |
| May 4 | Th | **Lab Test 2** | ​ |
| May 5 | F | **Test 2** | **Chapters 8-19, 24** |
| **Final Exams** | | | |
| May 1 | M | **Final Exam** 12:30-1:40pm | **Comprehensive** |

**Grading**

|  |  |  |  |
| --- | --- | --- | --- |
| **#** | **Item** | **Pts.** | **Total** |
| 13 | Quizzes (lowest dropped) | 30 | 360 |
| 14 | Labs (lowest dropped) | 35 | 455 |
| 2 | Tests | 150 | 300 |
| ​2 | ​Lab Tests | ​150/150 | 300 |
| 1 | Final Exam - Comprehensive | 200 | 200 |
|  | Class Participation (Attendance, in-class exercises, etc.) | 100 | 100 |
| ​ | ​ | ​ | ​ |
| ​ | **TOTAL** | ​ | **1715** |

**Scale**

|  |  |
| --- | --- |
| A | 90-100 |
| B | 80-89 |
| C | 70-79 |
| D | 60-69 |
| F | < 60​ |

​​​