CMSC 240: Linux Systems Administration (Fall 2018)
http://marmorstein.org/~robert/Fall2018/cs240.html

Instructor: Robert Marmorstein, 395-2185, marmorsteinrm@longwood.edu

Office Hours:
> 2:00pm – 4:00pm MWF (Ruffner 329)
> 3:15pm – 4:00pm TR (Stevens 118)
> or by appointment (please e-mail me at least 24 hours in advance)

Lecture (Ruffner 354): 2:00pm-3:15pm(TR)

Course Description: A hands-on approach to use and administration of Linux-based operating systems. Emphasizes file systems, process management, account management, software patching and maintenance, text manipulation, and the use of scripts to automate administrative tasks.   3 credits.

Prerequisite: *CMSC 162 or permission of instructor.*

Textbook: We will be using two books in this course.

The first book is "Unix Shell Programming" by Lowell Jay Arthur and Ted Burns, Fourth Edition, ISBN: 978-0471168942.

The second book is "LPI Linux Essentials Certification All-in-One Exam Guide" by Robb Tracy, April 2013, McGraw-Hill, ISBN: 978-0-071-81101-9.

We will also be using several free on-line resources and the UNIX Programmer's Manual (accessed via the "man" command). Be sure to check the course web site for links to other materials.

Course Student Learning Outcomes: By the end of the course, the successful student will be able to:

> – install, configure, and maintain a Linux system

> – efficiently use the Vim text editor to create and edit documents

> – use standard UNIX system tools for software development and system maintenance

> – write small scripts and utilities using BASH

Course Structure and Student Expectations:

This is a lecture-driven course with a significant hands-on lab component. You should expect to spend roughly 4-5 hours a week on reading, homework assignments, and projects.

Projects: This is a heavily lab-driven course. During class, we will complete short, usually ungraded, example exercises. These will prepare you for the graded projects. There will be at least six laboratory projects, which you will complete on your own time. They will vary in difficulty and complexity. Successful completion of the projects is a critical element of the course and comprises a significant portion of your course grade.

Tests: The only exam in this course will be the final exam. It will be a comprehensive, practical, exam covering all substantive topics of the course and designed to match the type and content of problems on professional Linux certification exams.

Quizzes and Homework Problems: In addition to weekly or bi-weekly homework assignments, I will give unannounced (pop) quizzes over topics from the reading assignments.

Course Requirements: Your grade will be determined by your performance on the final exam (25% of your grade), course projects (50%) and homework problems/quizzes (25%). See the tentative schedule below for due dates.

Attendance:

    This class is heavily lecture-driven and will require your regular attendance. I expect you to attend class unless you are sick or engaged in a school sponsored sports event or extra-curricular activity. In accordance with Longwood policy, missing more than 10% of scheduled class time will result in loss of one letter grade.   Absences for school events, illness, or exceptional circumstances may be excused if you make arrangements with me within 12 hours of the missed class. Students who miss more than 25% of classes, for any reason, may – at my discretion – receive an F for the course.

Grading Policy:

    Late work will not be accepted unless you have a medical condition or family emergency which prevents you from completing the assignment on time. In such circumstances, you do not need a doctor's note, but you must contact me by e-mail at least 12 hours before the assignment is due to explain the circumstances and arrange to make up the work. Such exceptions are granted very rarely. Of course, you may also apply slip days to extend your projects, if you have them. You do not need to contact me in order to use slip days. Technical problems involving the use of the submit system, your computer, or lab resources are not valid reasons to submit work late (that is what slip days are for). Final letter grades will be based on the following scale:

	A: 91 – 100%	A-: 90%
B+: 89%	B: 81 – 88%	B-: 80%
C+: 79%	C: 71 – 78%	C-: 70%
D+: 69%	D: 64 – 68%	F: 0 – 63%

(Note: there is no grade of D- in this course)

Cell Phones and Laptops:

    Cell phones, music players, and laptops must be turned off and put away during lecture and class discussions unless I have specifically requested that you use them. Violations of this policy will be considered an unexcused absence and may also affect your homework or participation grades.

Food and Drink:

    Please do not eat in class (it distracts me and the other students). You may bring water or other non-alcoholic beverages to class. I occasionally make exceptions to this rule for students who would otherwise miss lunch or have medical needs that require them to eat in class. If you feel that you need such an exception, you MUST make arrangements with me before you bring food to class (preferably by e-mail). Violations of this policy will be considered an unexcused absence and may also affect your homework or participation grades.

Mental Health, Disabilities, and Sexual Assault:

    I follow Longwood's campus policies on Mental Health, Disability Accommodation, and Mandatory Reporting of Sexual Assault and Other Crimes. Please see http://www.longwood.edu/academicaffairs/syllabus-statements/ for the complete policy.

Honor Code:

I take the honor code very seriously. I encourage you to take advantage of the freedom it gives you to collaborate with other students and to use print and Internet resources to better understand the material.

Because it is possible to abuse these resources in a way that actually hinders you from learning or disadvantages other students, I have established some guidelines for their use that you MUST follow.

Please read these rules carefully. It is your responsibility to know them and follow them.

Exams and quizzes are to be completed entirely on your own. They will be closed book/closed notes exams on which you may receive no external help and may use no resources other than your brain and a writing instrument (unless explicitly stated in class).

On homework and lab projects, you may discuss your work with other students subject to these restrictions:

1. Turn in only your own work

The work you submit should, in general, be your own original work or material which I have provided and you have suitably modified. You **MAY** discuss problems with others in a general way. You **MAY** assist other students (or get assistance) with simple problems like syntax errors, but you **MAY NOT** copy solutions or large blocks of code from each other.

On projects, a good guideline of what "large" means is that copying one or two lines of code is usually okay, but copying a complete function or more than three complete statements is usually too much.

The purpose of this rule is to ensure that you understand the code or answers you are submitting. If you don't think you could explain your work to me without help or looking at a book or web page, you probably should not submit it.

2. Do not copy code electronically

Any work you turn in should be work which YOU have typed or hand-written.

This doesn't mean you can't look online for help with a project. It does mean that you must re-type any code you find and not download it or copy/paste it.

You may not share code with other students using flash drives, cell phones, e-mail, web sites, floppies, CDs, or any other electronic storage or communication device unless you are both assigned to the same group for a project. You may not print out copies of your code to share with other students (personal copies or copies to bring to office hours are fine as long as you don't leave them lying around the lab).

Feel free to discuss projects and homework using the markerboard – just be sure that when you are done you erase your work before you leave the room. Do NOT take pictures of such code on your phone.

3. Give proper attribution

Whenever you use any kind of resource (including other people), you should give credit to your source. On homework assignments, simply add a note in the margin next to the answer on which you received help. In code, you should add comments to give proper credit. A simple comment like

```
/* Based on http://codewarrior.com */
```

> *or*

```
// Susan helped me with this step
```

is fine. The comment should go directly above the line or lines on which you received help to make it clear which parts of your program are original and which are derived from other sources. You do not need to cite help you have received directly from me or from the textbook.

4. You are responsible for securing your code.

Helping other students to cheat is also cheating. Furthermore, it is your responsibility to make sure that other students do not use your work to cheat. Be careful with who you let access your computer and report any missing files, flash drives, or other devices to me promptly.

Infractions of these policies will be dealt with harshly under the Longwood Honor Code. Any student convicted of an honor offense involving this class will automatically receive a final course grade of **F** in addition to any penalties imposed by the Honor Board. You should consider all work in this class to be pledged work, whether or not the pledge appears on the assignment.

Tentative Course Schedule:

Week 1: Aug. 21 – 23	Introduction to the Linux command line:
	    Commands, History, Jobs and Processes, Files and Directories
	    Permissions, Redirection, Pipes, and Filters
	    Read Ch. 1 of Linux Essentials (p. 1 – 22)
	    Read Ch. 2 of Arthur & Burns (p. 15 – 30)
	    Skim Ch. 2 of Linux Essentials (Read at least p. 49 – 54)

Aug. 27	**Last day of Add/Drop (by 5pm)**

Week 2: Aug. 28 – Aug. 30	Introduction to the Vim text editor:
	    Modes, Movement and Selection, Searching, Buffers and Swapfiles, Copy/Paste
	    Read Ch. 5 of Linux Essentials (p. 127 – 175)
	    Start "A byte of vim" (see course web site)
	    Lab 1: VIM

Week 3: Sept. 4 – 6	Advanced Vim:
	    Undo/Redo, Folds, Windows and Tabs, Scripting
	    Finish "A byte of vim"

Week 4: Sept. 11 – 13	Development Tools:
	    Makefiles
	    Autotools
	    Git and Source Control
	    Configuring/Compiling the Linux Kernel
	    Read Ch. 4 of Linux Essentials (p. 109 – 123)
	    Lab 2: Git
	
	Debugging Tools:
	    Gdb and Valgrind
	    Read "Wisconsin Valgrind Tutorial" (see course web site)
	
	Static Analysis Tools:
	    splint, indent, strace
	    Read presentation "Secure Programming: An Introduction to Split" (see course web site)

Week 5: Sept. 18 – 20	Regular Expressions, Data Selection and Text Transformation Tools:
	    grep, sed, awk, cut, paste, fmt
	    Read Ch. 7 of Linux Essentials (p. 219 – 240)
	    Read Ch. 3 of Arthur and Burns (p. 33 – 68)

Week 6: Sept. 25 – 27	Operating System Installation:
	    Partitioning, Filesystems
	    Read Ch. 6 of Linux Essentials (p. 187 – 215)
	    Lab 3: Linux Installation

Week 7: Oct. 2 – 4	Virtual Machines and Containers **Read "Introduction to Containers" (see course web site)**

Week 8: Oct. 9 – 11	Operating Systems Maintenance:
	    Software Installation and System Updates
	    User Management and Passwords
	    Printing
	    Read Ch. 8-9 of Linux Essentials (p. 245 – 275, 279 – 295)

Oct. 15 – Oct. 16	**Fall Break: No Class**

Week 9: Oct. 18	Logging and Maintenance:
	    Backups and Archives
	    Logging and Log Files
	    Cron Jobs
	    Read Chapters 10-11 of Linux Essentials (p. 301 – 313, 317 – 351)

Week 10: Oct. 23 – 25	Networking and File Sharing:
	NFS, Firewalls and Security
	Read Ch. 13 of Linux Essentials (p. 383 – 433)
	Lab 4: Networking

Week 11: Oct. 30 – Nov. 1   Server Administration:
                              Web Servers, SSL, Virtual Hosting, Web Authentication
                              Mail Servers
                              Lab 5: LAMP

Week 12: Nov. 6 – 8   Introduction to Shell Scripting:
                              Shell Variables, Quoting, Comparisons, Expressions, Arithmetic, Loops, and Control Structures
                              Read Ch. 5 of Arthur and Burns (p. 113 – 154)
                              Lab 6: Scripts

Week 13: Nov. 13 – 15   Advanced Scripting:
                              Shell functions, Shell Input, Reporting
                              Read Ch. 6 of Arthur and Burns (p. 157 – 216)

Week 14: Nov. 20   Catchup and Review
                              Read Ch. 8 of Arthur and Burns (p. 261 – 277)

Nov. 23-25   **Thanksgiving Break: No Class**

Week 15: Nov. 27 – 29   Catchup and Review

Dec. 6   **Final Exam (Thursday, 11:30am - 2:00pm)**