

SYLLABUS
Oakland University
School of Engineering and Computer Science
Department of Computer Science and Engineering
CSI3660
System Administration

COURSE INFORMATION

Course:	CSI3660 - System Administration
Day/Time:	MW 1:00pm - 2:47pm
Semester/Year:	Fall 2018
Class Location:	O'Dowd 202C
Credits:	4
Webpage:	http://moodle.oakland.edu
Textbook (not required):	Linux Command Line and Shell Scripting Bible - 3rd Edition Blum and Bresnahan ISBN: 9781118983843 CourseSmart eTextbook Referral Link (available on Moodle)
Course Format:	Traditional
Professor:	Dr. Erik Fredericks
Email:	fredericks@oakland.edu
Phone:	(248) 370-4075
Office:	EC530
Office hours:	TR 1:00pm – 2:00pm or by appointment
TA:	TBD

COURSE DESCRIPTION

This course teaches the skills necessary to analyze, deploy, manage and troubleshoot enterprise computing infrastructures. Topics include user authentication management, system configuration and management, periodic tasks automation, network file systems and data backup techniques, server deployments, and system performance analysis techniques.

Prerequisite(s): CSI 2470 and major standing in CSI.

LEARNING OUTCOMES

Following completion of this course, students should be able to perform the following:

- Describe the core concepts of the Linux file system using common commands
- Use common features and commands in the Bash shell, including redirection, piping, aliasing, environment variables, file searching, etc.
- List Linux permissions and successfully assign appropriate permissions to users and groups
- Describe how system processes, including priority, attributes, scheduling, and killing, work in the Linux environment
- Implement best practices for logging and documenting of system configurations and services
- Implement appropriate user management practices for specific applications
- Describe the network configuration process including TCP/IP configuration, name resolution, and network utilities, including remote administration techniques
- Configure network services including SSH, SFTP, email, databased, etc.
- Implement system maintenance and troubleshooting techniques
- Follow best practices for securing a Linux system against common attacks
- Use monitoring and network management tools
- Use a scripting and/or programming language to automate common tasks

GRADING

The final grade for this course is based on the following weights:

Participation (in-class assignments, class activities, Moodle quizzes)	10%
Homework assignments	30%
Project	30%
Midterm exam	15%
Final exam	15%

Grading scale:

90% – 100%:	3.6 – 4.0
80% – 89%:	3.0 - 3.5
70% – 79%:	2.6 - 2.9
60% – 69%:	2.0 - 2.5
0% – 59%:	0.0 - 1.9

EXAMS

There will be **two exams** in this class: a midterm and a final. Each will be worth 15% of your final grade.

MIDTERM EXAM: **October 17th, 2018 – 1:00pm – 2:47pm, O’Dowd 202C**

FINAL EXAM: **December 10th, 2018 – 3:30pm – 6:30pm, O’Dowd 202C**

PROJECT

There will be a semester-long **1–3** person course project that will demonstrate your knowledge of creating and maintaining a specialized server. Each project is centered around creation and maintenance of a server geared towards a particular task (e.g., bug reporting, shared web hosting, video game server, etc.). The project will be worth 30% of your grade, where this grade will be based mainly on final documentation and deliverables. You will have the option to choose your specialization, however there will be some minimum services that are required. The minimum services will largely be implemented as a part of in-class labs and homework (more detail will be provided on that later). If you decide to work in a team, I will expect that (i) the project selected be difficult enough to merit more than 1 person, (ii) each team member contributes an equal amount of effort in both technical and documentation efforts, and (iii) that the final documentation includes a detailed report of the tasks each team member accomplished. For instance, it will be unacceptable for one person to do the documentation and the other to do all the technical work.

TOPICS COVERED

This section highlights the key concepts we will be covering throughout the semester.

- **Linux system:** kernels, distributions, file system structure, common shell commands
- **System management:** manage files and directories in a Linux system, file linking, file and directory permissions
- **System administration:** create, mount, and manage Linux file systems; user administration; logging and visualizations
- **Processes:** understand the different types of processes, view process attributes, change process priority, kill running processes, process scheduling
- **Compression and backup:** understand how to use common utilities for compressing files and performing system backups
- **Network configuration:** understand basic Linux networking concepts as well as common supporting utilities, TCP/IP and NIC configuration, name resolution, remote administration
- **Network services:** configuration of network administration, web services, file and directory sharing, remote logins
- **Troubleshooting:** common problems and how to resolve them with respect to hardware or software, common utilities for resolving performance issues,
- **Security:** protect against common attacks, secure system against unauthorized access
- **Documentation:** best practices for documenting configurations and services, team communication

ASSIGNMENTS

There will be approximately 6 homework assignments that will be mostly tied into your final project and be used to ensure that you are making progress towards the final project deliverable. All homework assignments are to be turned in via Moodle (email/paper assignments will not be accepted unless otherwise specified). Points for each assignment will vary based on difficulty, but will average out to comprise 30% of your final grade.

CLASS POLICIES

- **Class attendance:** I will not be taking attendance, however it is up to you to keep up with course materials and homework. There will be in-class assignments sporadically assigned that will be due at the end of class and Moodle quizzes due by the end of the day. These will increase in frequency if I notice class attendance dropping. If you miss an in-class assignment and had either an approved university absence, a medical emergency, or an extended absence due to work-related reasons, please contact me to make up the assignment.
- **Late policy:** This course covers a lot of material, and as such, submitting assignments late can seriously hinder your ability to keep up with the material. As such, late assignments will receive a 10% penalty for each day that it is late. All homework assignments are due by 11:59pm (EST) on the specified date and must be submitted to Moodle.
- **Cooperation and cheating:** You are welcome to discuss the homework assignments and projects with any other members of the class, myself, or the TA. However, do not copy answers from each other, as cheating is not tolerated. Any instances of cheating or plagiarism will be reported to the university and you will likely lose credit for the course. If you are found to be cheating or plagiarizing on an exam, you will receive a grade of 0 and will most likely fail the course. Please read the Academic Conduct Regulations for more information (<http://catalog.oakland.edu/content.php?catoid=14&navoid=700>).
- **Exams:** Exams are closed book and must be taken within the allotted class time. If you are unable to take an exam due to sickness, work requirements, or some other university-approved absence, contact me as soon as possible to schedule a makeup. Please note that you must provide appropriate evidence as to why you could not attend the scheduled exam.
- **Cell phone / devices:** This is a course specifically for learning about computing technology and I have no problem with you using your devices during class to take notes or work through examples. However, I do require that all devices be muted during class time. If you are disruptive I will ask you to turn off your device. Failing that, I will ask you to leave.
- **Distribution:** We will be using CentOS 7 throughout this course for homework assignments and the course project. There will be a virtual machine created on the university server for each student, and you will be expected to administer and maintain the virtual machine appropriately. Login details regarding the virtual machine will be distributed in the first week of class. You are welcome to setup a virtual machine on your own personal device for testing, however keep in mind that

all assignments must be completed on the university's virtual machine. We will also have access to Google Cloud for virtualized servers as well, but more details on that will be provided in class.

- **Moodle:** All course materials (lecture notes, homework assignments, etc.) will be posted to Moodle as they become available. Students are expected to check Moodle regularly for course updates. All homework assignments are to be submitted through Moodle by 11:59pm on the specified date.
- **Contact:** The best method to contact me is via email (fredericks@oakland.edu). I will do my best to get you an answer as soon as possible, as long as the email is sent at a reasonable hour.

ADDITIONAL POLICIES

1. **Academic conduct policy:** All members of the academic community at Oakland University are expected to practice and uphold standards of academic integrity and honesty. Academic integrity means representing oneself and ones work honestly. Misrepresentation is cheating since it means students are claiming credit for ideas or work not actually theirs and are thereby seeking a grade that is not actually earned. Following are some examples of academic dishonesty:
 - (a) Cheating on examinations. This includes using materials such as books and/or notes when not authorized by the instructor, copying from someone elses paper, helping someone else copy work, substituting anothers work as ones own, theft of exam copies, or other forms of misconduct on exams.
 - (b) Plagiarizing the work of others. Plagiarism is using someone elses work or ideas without giving that person credit; by doing this students are, in effect, claiming credit for someone elses thinking. Whether students have read or heard the information used, they must document the source of information. When dealing with written sources, a clear distinction should be made between quotations (which reproduce information from the source word-for-word within quotation marks) and paraphrases (which digest the source of information and produce it in the students own words). Both direct quotations and paraphrases must be documented. Even if students rephrase, condense or select from another persons work, the ideas are still the other persons, and failure to give credit constitutes misrepresentation of the students actual work and plagiarism of anothers ideas. Buying a paper or using information from the World Wide Web or Internet without attribution and handing it in as ones own work is plagiarism.
 - (c) Cheating on lab reports by falsifying data or submitting data not based on the students own work.
 - (d) Falsifying records or providing misinformation regarding ones credentials.
 - (e) Unauthorized collaboration on computer assignments and unauthorized access to and use of computer programs, including modifying computer files created by others and representing that work as ones own
2. **Add/Drops:** The university policy will be explicitly followed. It is the students responsibility to be aware of deadline dates for dropping courses.

3. **Special Considerations:** Students with disabilities who may require special accommodations should make an appointment with campus Disability Support Services, 106 North Foundation Hall, phone 248 370-3266. Students should also bring their needs to the attention of the instructor as soon as possible by providing the Letter of Accommodations created by DSS. For academic help, such as study and reading skills, contact the Academic Skills/Tutoring Center, 103 North Foundation Hall, phone 248 370-4215.
4. **Excused Absence Policy:** This policy for university excused absences applies to participation as an athlete, manager or student trainer in NCAA intercollegiate competitions, or participation as a representative of Oakland University at academic events and artistic performances approved by the Provost or designee. Students shall inform their instructors of dates they will miss class due to an excused absence prior to the date of that anticipated absence. For activities such as athletic competitions who schedules are known prior to the start of a term, students must provide their instructors during the first week of each term a written schedule showing days they expect to miss classes. For other university excused absences students must provide each instructor at the earliest possible time the dates that they will miss.
5. **Make-up work (excused absence):**
 - It is the responsibility of the student to request from the instructor an opportunity to complete missed assignments, activities, labs, examinations or other course requirements in a timely manner.
 - Students are responsible for all material covered in classes that they miss, even when their absences are excused, as defined above.
 - Missed classroom activities will be rescheduled at the discretion of the instructor.

PROGRAM OUTCOMES

Program outcomes are a set of skills that assure the achievement of the program educational objectives and are necessary for professional engineering practice. Before graduating, SECS students will demonstrate their skills in the following key areas:

1. An ability to apply knowledge of computing and mathematics appropriate to the discipline
2. An ability to analyze a problem, and identify and define the computing requirements appropriate to its solution
3. An ability to design, implement and evaluate a computer-based system, process, component, or program to meet desired needs
4. An ability to function effectively on teams to accomplish a common goal
5. An understanding of professional, ethical, legal, security, and social issues and responsibilities
6. An ability to communicate effectively with a range of audiences
7. An ability to analyze the local and global impact of computing on individuals, organizations and society

8. Recognition of the need for, and an ability to engage in, continuing professional development
9. An ability to use current techniques, skills, and tools necessary for computing practice
10. An ability to use and apply current technical concepts and practices in the core information technologies
11. An ability to identify and analyze user needs and take them into account in the selection, creation, evaluation and administration of computer-based systems
12. An ability to effectively integrate IT-based solutions into the user environment
13. An understanding of best practices and standards and their application
14. An ability to assist in the creation of an effective project plan

SCHEDULE OF TOPICS COVERED

Please note that this is an approximate schedule, and as such, exact dates are not provided. Some topics may run shorter, some may run longer, and some may be switched around entirely based on how the class is proceeding.

Module 1	Course introduction
Module 2	Management Filesystems and Compression
Module 3	Processes and Booting
Module 4	Scripting (Bash)
Module 5	More (Bash) Scripting
Module 6	Logging and Packages Printing
Module 7	Midterm Review MIDTERM
Module 8	Network Services
Module 9	Networking (Continued) and Security Advanced Scripting (Bash)
Module 10	Grep and Sed Troubleshooting and Ethics
Module 11	Gawk
Module 12	Guest Lecture
Module 13	Presentations
Module 14	Presentations
FINAL EXAM	TBD