Master Course Syllabus

For additional course information, including prerequisites, corequisites, and course fees, please refer to the Catalog: https://catalog.uvu.edu/

Semester: Spring
Course Prefix: CS
Course Title: Operating Systems Theory

Year: 2025
Course and Section #: 3060-X02
Credits: 3

Course Description

This introduces the Unix operating system. Presents the underlying theory and concepts of an operating system and covers the following topics in depth: device management, processes, threads, synchronization, scheduling, deadlocks, memory management, virtual memory, and file systems. Provides practical experience in writing programs in the C language that use standard Unix system calls to interface directly with the operating system.

Course Attributes

This course has the following attributes:
☐ General Education Requirements
☐ Global/Intercultural Graduation Requirements
☐ Writing Enriched Graduation Requirements
☒ Discipline Core Requirements in Program
☐ Elective Core Requirements in Program
☐ Open Elective
Other: *Click here to enter text.*

Instructor Information
Instructor Name: Dr. Jason Gill

Student Learning Outcomes

 the end of this course, you should be able to:

- Describe the basic functions of an operating system
- Describe the major components of an operating system
- Explain the basic algorithms for Process Scheduling, Memory Management and Storage Management
- Write reasonable complex programs in C on a Unix-based operating system

Course Materials and Texts

Required Text

https://www.academia.edu/42880365/Operating_System_Concepts_10th_EditionLinks to an external site.

   Textbook .pdf: Operating_System_Concepts_10th_Edition.pdf Download Operating_System_Concepts_10th_Edition.pdf

Additional Text book Materials: https://codex.cs.yale.edu/avi/os-book/OS10/index.htmlLinks to an external site.

these materials Include:

- **Linux Virtual Machine**
- Power Point Slides
- Demo C code
- OS information
- Practice Questions

Required Text

This is the classic C Programming text.

Download link: https://github.com/auspbro/ebook-c/blob/master/The.C.Programming.Language.2Nd.Ed%20Prentice.Hall.Brian.W.Kernighan.and.Dennis.M.Ritchie..pdfLinks to an external site.

   Here is the .pdf of the book: The.C.Programming.Language.pdf Download The.C.Programming.Language.pdf

Optional Text (but a very good C and GNU reference)

Download link: http://neologix.free.fr/c/gnu_c_programming_tutorial.pdfLinks to an external site.

Course Requirements

Course Assignments, Assessments, and Grading Policy

Assignments & Grading Policy

This class has eight programming assignments that make up about 60% of your total grade. This should inform you on how important completing the assignments are for this course. Assignments are graded for full credit up to the assignment submission deadline. **This deadline is 11:59 pm in the due date.**

Late work will be penalized 10% of the full credit of the assignment **per week.** No submission will be accepted after one week without prior approval.

Instructor's suggestion: If you're going to submit an assignment late, own the penalty and use the time to submit the best possible work.

The assignments will not be graded if it cannot be compiled or run from the Linux command line. I compile them from the command line in my Linux environment. This means that you have to

create and test your solution on Linux as you will be directly accessing the Linux OS via your program code.

You will be programming the C language, as this is a language that works closely with most operating systems. It is the language that the Linux code was written in. You should have learned C++ in the CS2370 class, and C is not very different. The one major change between C++ and C is the lack of object-oriented programming. We will be programming on the command line, so we will not be using any fancy pants IDE. Just a good old text editor and a command line Make file. I call this Gorilla programming, and it is the best way to learn the technical systems of a OS.

I do provide some C Language lecture videos, and there is provided a excellent C language text and a C and gnu programming text. As for the assignments you should be comfortable with C pointers, dynamic memory allocation, C arrays, functional decomposition, and linked lists.

Once again, your programs will be built and tested on Linux. You will be introduced to writing programs for the Linux Operating System. You will learn about basic remote editing, the GCC C compiler, linking, the make build system, creating a compressed tarball, and GIT source code management. You will be provided with a Oracle VM (VirtualBox) with a pre-loaded version of the Ubuntu OS (see Syllabus). VirtualBox is compatible with Windows 10 and 11, and the Intel based MacOS. As of this date it is not compatible with Apple silicon (Arm64) m1 and m2 machines. You do not have to use VirtualBox if you have a Linux installed natively on a computer, or if you have another VM this you like. **The only requirement is that you have a Linux Ubuntu OS environment to program in.** The Mac Terminal or the Windows Command Window are **not** an acceptable option in this class. In order to receive a grade, every source code file must include an Originality Disclaimer.

Exams

In this class there are four quizzes, one C language quiz, and one final exam. All quizzes and exams are open book. With that said, please note that the book should be used as a reference, and the only way to properly use the book as a reference is to know the content of the book in the first place. The quizzes will be administered via the Canvas course management system. The final exam will be administered on-line during finals week. **Do not miss the final!**

Required or Recommended Reading Assignments
Operating System Concepts, Tenth; Silberschatz, Galvin, and Gagne.
https://www.academia.edu/42880365/Operating_System_Concepts_10th_Edition

The C Programming Language; Kernighan and Ritchie.
https://github.com/auspbro/ebook-c/blob/master/The.C.Programming.Language.2Nd.Ed%20Prentice.Hall.Brian.W.Kernighan.and.Dennis.M.Ritchie..pdf

General Description of the Subject Matter of Each Lecture or Discussion
Virtual Machine install/configure
First Program
The fork() and exec() system calls
Multithreaded program
Synchronization

Processes and threads
CPU scheduler simulator
Calculating memory page and offset
Block access algorithms
Read directory and file information

Required Course Syllabus Statements

Generative AI

Artificial Intelligence (AI) Expectations and Requirements

Students should use ChatGPT or other AI tools as if it were a person. If asking another person to do task X is cheating, then asking ChatGPT and similar tools is cheating. If not, then not.

Using Remote Testing Software
☒ This course does not use remote testing software.

☐ This course uses remote testing software. Remote test-takers may choose their remote testing locations. Please note, however, that the testing software used for this may conduct a brief scan of remote test-takers' immediate surroundings, may require use of a webcam while taking an exam, may require the microphone be on while taking an exam, or may require other practices to confirm academic honesty. Test-takers therefore shall have no expectation of privacy in their test-taking location during, or immediately preceding, remote testing. If a student strongly objects to using test-taking software, the student should contact the instructor at the beginning of the semester to determine whether alternative testing arrangements are feasible. Alternatives are not guaranteed.

Required University Syllabus Statements

Accommodations/Students with Disabilities
Students needing accommodations due to a permanent or temporary disability, pregnancy or pregnancy-related conditions may contact UVU [Accessibility Services](#) at accessibilityservices@uvu.edu or 801-863-8747.

Accessibility Services is located on the Orem Campus in BA 110.

Deaf/Hard of Hearing students requesting ASL interpreters or transcribers can contact Accessibility Services to set up accommodations. Deaf/Hard of Hearing services can be contacted at DHHservices@uvu.edu

DHH is located on the Orem Campus in BA 112.

Academic Integrity
At Utah Valley University, faculty and students operate in an atmosphere of mutual trust. Maintaining an atmosphere of academic integrity allows for free exchange of ideas and enables all members of the community to achieve their highest potential. Our goal is to foster an intellectual atmosphere that produces scholars of integrity and imaginative thought. In all academic work, the ideas and contributions

of others must be appropriately acknowledged and UVU students are expected to produce their own original academic work.

Faculty and students share the responsibility of ensuring the honesty and fairness of the intellectual environment at UVU. Students have a responsibility to promote academic integrity at the university by not participating in or facilitating others' participation in any act of academic dishonesty. As members of the academic community, students must become familiar with their rights and responsibilities. In each course, they are responsible for knowing the requirements and restrictions regarding research and writing, assessments, collaborative work, the use of study aids, the appropriateness of assistance, and other issues. Likewise, instructors are responsible to clearly state expectations and model best practices.

Further information on what constitutes academic dishonesty is detailed in UVU Policy 541: *Student Code of Conduct*.

Equity and Title IX

Utah Valley University does not discriminate on the basis of race, color, religion, national origin, sex, sexual orientation, gender identity, gender expression, age (40 and over), disability, veteran status, pregnancy, childbirth, or pregnancy-related conditions, citizenship, genetic information, or other basis protected by applicable law, including Title IX and 34 C.F.R. Part 106, in employment, treatment, admission, access to educational programs and activities, or other University benefits or services. Inquiries about nondiscrimination at UVU may be directed to the U.S. Department of Education's Office for Civil Rights or UVU's Title IX Coordinator at 801-863-7999 – TitleIX@uvu.edu – 800 W University Pkwy, Orem, 84058, Suite BA 203.

Religious Accommodation

UVU values and acknowledges the array of worldviews, faiths, and religions represented in our student body, and as such provides supportive accommodations for students. Religious belief or conscience broadly includes religious, non-religious, theistic, or non-theistic moral or ethical beliefs as well as participation in religious holidays, observances, or activities. Accommodations may include scheduling or due-date modifications or make-up assignments for missed class work.

To seek a religious accommodation, a student must provide written notice to the instructor and the Director of Accessibility Services at accessibilityservices@uvu.edu. If the accommodation relates to a scheduling conflict, the notice should include the date, time, and brief description of the difficulty posed by the conflict. Such requests should be made as soon as the student is aware of the prospective scheduling conflict.

While religious expression is welcome throughout campus, UVU also has a specially dedicated space for meditation, prayer, reflection, or other forms of religious expression.