Course Syllabus

Course Name: Operating Systems I
Course Number: CS344
Credits: 4
Instructor: Justin Goins
Instructor Email: Justin.Goins@oregonstate.edu
Contact information for teaching assistants is available on the syllabus page in Canvas.

Office Hours Schedule

Office hours will be held on Slack and/or Zoom. The office hour schedule and connection details are given on the home page within Canvas.

Course Description

Introduction to operating systems using UNIX as the case study. System calls and utilities, fundamentals of processes and interprocess communication.

Prerequisites: CS 261 with C or better and (CS 271 [C] or ECE 271 [C])

Communication

Please post all course-related questions in the Piazza Forum so that the whole class may benefit from our conversation. Please contact me privately for matters of a personal nature. We will strive to reply to course-related questions within 48 business hours. We will strive to return your assignments and grades for course activities to you within one week of the due date. You can find a detailed communication policy as well as information on Slack Office Hours on the course homepage (within Canvas).

Note: Students in one section of this course may be required to interact with teachers, teaching assistants, and students in other concurrent sections of this same course.

Lecture Times

MW 4pm-5:50pm in Zoom (see Canvas for link)

Technical Assistance

If you experience any errors or problems while in your online course, contact 24-7 Canvas Support through the Help link within Canvas. If you experience computer difficulties, need help downloading a browser or plug-in, or need assistance logging into a course, contact the IS Service Desk for assistance. You can call (541) 737-8787 or visit the IS Service Desk online.

Measurable Student Learning Outcomes

At the completion of the course, students will be able to...

1. **Justify** the need for a multi-programmed OS and explain the general structure of such systems.
2. **Select** system calls for appropriate uses.
3. **Compare** and **contrast** the process and thread abstractions and select an appropriate abstraction.
4. **Assess** and **solve** possible issues related to concurrent execution.
5. **Explain** the file abstraction and system level I/O.
6. **Compare** and **choose** mechanisms for inter-process communication.
7. **Write** software by applying appropriate system programming principles and techniques.

Learning Resources

[Optional] Michael Kerrisk, The Linux Programming Interface (TLPI), No Starch Press, 2010, ISBN: 978-1-59327-220-3.

For C, the following material is freely available online:

- The Linux man-pages project for documentation of system calls and C library functions
- Carl Burch. C for Python Programmers, Hendrix College, 2011
- Mike Banahan, Declan Brady, and Mark Doran. The C Book, Addison Wesley, 1991
- Jens Gustedt. Modern C, Manning Publications. 2019, ISBN 978-1-61729-581-2

For Rust, the following material is freely available online:

- Steve Klabnik and Carol Nichols. The Rust Programming Language, No Starch Press, 2019, ISBN 978-1-71850-044-0

Evaluation of Student Performance

Final grades will be comprised of the following weighted components:

- 70% 6 Programming Assignments
- 30% Final Exam (unproctored)

Final Letter Grades

Grade	Percent Range
A	93 or higher
A-	90-92.99
B+	87-89.99
B	83-86.99
B-	80-82.99
C+	77-79.99
C	73-76.99
C-	70-72.99
D+	67-69.99
D	63-66.99
D-	60-62.99
F	0-59.99

Course Content

- Topics: Introduction to basic structure of modern general-purpose operating systems; system calls; processes, threads; concurrency and synchronization; files; I/O; inter-process communication.
- Programming assignments will use C and Rust programming languages. No prior experience with either C or Rust is required and the needed knowledge will be covered during the course.
- The course material is presented over the course of six Blocks, the culmination of each being a specific, detailed programming assignment geared towards the material covered. The blocks correspond to the modules as follows:
    - Block 1: Modules 1, 2
    - Block 2: Module 3
    - Block 3: Modules 4, 5
    - Block 4: Module 6
    - Block 5: Modules 7, 8
    - Block 6: Modules 9, 10

Module	Topic	Reading Assignments	Learning Activities
1	Introduction to OS, Unix & C	Online resources	Assignment 1
2	Introduction to C	Online resources	Assignment 1
3	Files & Directories	TLPI Ch 3, 4, 5, 6, 7	Assignment 2
4	Processes I	TLPI Ch 24, 25, 26, 27	Assignment 3
5	Processes II	TLPI Ch 20, 21, 34	Assignment 3
6	Concurrency & Threads	TLPI Ch 29, 30	Assignment 4
7	Inter-process Communication	TLPI Ch 43, 44, 53	Assignment 5
8	Network Programming	TLPI Ch 58, 59, 60, 63	Assignment 5
9	Introduction to Rust	Online resources	Assignment 6
10	Rust & Safe System Programming	Online resources	Assignment 6
			Final Exam

Course Policies

Late Work Policy

All assignments must be submitted on Canvas, according to the posted due date and time.

All assignments will be accepted within 48 hours of the due date, with the penalties shown below.

- Assignments submitted within 24 hours of the due date will be accepted with a penalty of 5% of the grade.*
- Assignments submitted within 48 hours of the due date will be accepted with a penalty of 10% of the grade.*
- Assignments submitted later than 48 hours of the due date will not be accepted without a documented medical or family emergency and will receive a grade of 0.

*Note that the late penalties are off of the total possible points, not the points you earn. E.g., if an assignment has 160 points possible then a late submission within 24 hours of the due date will be deducted 8 points.

The Final Exam cannot be submitted later than the posted due date.

Makeup Exams

Makeup exams will be given only for missed exams excused in advance by the instructor. Excused absences will not be given for airline reservations, routine illness (colds, flu, stomach aches), or other common ailments. Excused absences will generally not be given after the absence has occurred, except under very unusual circumstances.

Incompletes

Incomplete (I) grades will be granted only in emergency cases (usually only for a death in the family, major illness or injury, or birth of your child), and if the student has turned in 70% of the points possible (in other words, usually everything but the final exam). If you are having any difficulty that might prevent you completing the coursework, please don't wait until the end of the term; let me know right away.

Statement Regarding Religious Accommodation

Oregon State University is required to provide reasonable accommodations for employee and student sincerely held religious beliefs. It is incumbent on the student making the request to make the faculty member aware of the request as soon as possible prior to the need for the accommodation. See the Religious Accommodation Process for Students.

Guidelines for a Productive and Effective Online Classroom

(Adapted from Dr. Susan Shaw, Oregon State University)

Students are expected to conduct themselves in the course (e.g., on discussion boards, email) in compliance with the university's regulations regarding civility. Civility is an essential ingredient for academic discourse. All communications for this course should be conducted constructively, civilly, and respectfully. Differences in beliefs, opinions, and approaches are to be expected. In all you say and do for this course, be professional. Please bring any communications you believe to be in violation of this class policy to the attention of your instructor.

Active interaction with peers and your instructor is essential to success in this online course, paying particular attention to the following:

- Unless indicated otherwise, please complete the readings and view other instructional materials for each week before participating in the discussion board.
- Read your posts carefully before submitting them.
- Be respectful of others and their opinions, valuing diversity in backgrounds, abilities, and experiences.
- Challenging the ideas held by others is an integral aspect of critical thinking and the academic process. Please word your responses carefully, and recognize that others are expected to challenge your ideas. A positive atmosphere of healthy debate is encouraged.

Expectations for Student Conduct
Student conduct is governed by the university's policies, as explained in the Student Conduct Code (https://beav.es/codeofconduct). Students are expected to conduct themselves in the course (e.g., on discussion boards, email postings) in compliance with the university's regulations regarding civility.

Academic Integrity
Integrity is a character-driven commitment to honesty, doing what is right, and guiding others to do what is right. Oregon State University students and faculty have a responsibility to act with integrity in all of our educational work, and that integrity enables this community of learners to interact in the spirit of trust, honesty, and fairness across the globe.

Academic misconduct, or violations of academic integrity, can fall into seven broad areas, including but not limited to: cheating; plagiarism; falsification; assisting; tampering; multiple submissions of work; and unauthorized recording and use.

It is important that you understand what student actions are defined as academic misconduct at Oregon State University. The OSU Libraries offer a tutorial on academic misconduct, and you can also refer to the OSU Student Code of Conduct and the Office of Student Conduct and Community Standard's website for more information. More importantly, if you are unsure if something will violate our academic integrity policy, ask your professors, GTAs, academic advisors, or academic integrity officers.

I have no problems with you working together to solve problems, work through coding bugs, etc. However, I do require that your code submissions and test answers be YOUR OWN WORK; do not complete any assignment as a group project.

You may *not* turn in work that has a substantial amount of someone else's program code, except for template code that we provide to you. If you do submit such work anyway, your submission will be reported to the College of Engineering for disciplinary action, and a preliminary 0 grade will be entered in for that assignment. The assignment grade will be finalized only when the College makes its ruling (which might not be for a few months).

We will *automatically compare* what you turn in against all other submissions, including this term, previous terms, other sections, and from online sources. Do not seek out previous submissions on GitHub (or other sources), even if you're only looking for inspiration.

To be clear: do not download someone else's code, change it, and then submit it, even if you cite what you are doing. This constitutes cheating and your submission will be reported to the College of Engineering for academic dishonesty.

Statement Regarding Students with Disabilities

Accommodations for students with disabilities are determined and approved by Disability Access Services (DAS). If you, as a student, believe you are eligible for accommodations but have not obtained approval please contact DAS immediately at 541-737-4098 or at http://ds.oregonstate.edu. DAS notifies students and faculty members of approved academic accommodations and coordinates implementation of those accommodations. While not required, students and faculty members are encouraged to discuss details of the implementation of individual accommodations.

Reach Out for Success

University students encounter setbacks from time to time. If you encounter difficulties and need assistance, it's important to reach out. Consider discussing the situation with an instructor or academic advisor. Learn about resources that assist with wellness and academic success at oregonstate.edu/ReachOut. If you are in immediate crisis, please contact the Crisis Text Line by texting OREGON to 741-741 or call the National Suicide Prevention Lifeline at 1-800-273-TALK (8255)

Student Evaluation of Courses

During Fall, Winter, and Spring term the online Student Evaluation of Teaching system opens to students the Wednesday of week 8 and closes the Sunday before Finals Week. Students receive notification, instructions and the link through their ONID. They may also log into the system via Online Services. Course evaluation results are extremely important and used to help improve courses and the hybrid learning experience for future students. Responses are anonymous (unless a student chooses to "sign" their comments, agreeing to relinquish anonymity) and unavailable to instructors until after grades have been posted. The results of scaled questions and signed comments go to both the instructor and their unit head/supervisor. Anonymous (unsigned) comments go to the instructor only.