COMP 3000 Operating Systems

Winter 2025

Course Instructor: Lianying Zhao
Email: firstname.lastname@carleton.ca
Class Time: Section A: 11:35 - 12:55, Mondays and Wednesdays, Section B: Asynchronous
Class Location: Refer to your time table on Carleton Central
Prerequisites: COMP 2401 with a minimum grade of C- and COMP 2402
Precludes: Additional credit for SYSC 4001
Includes: Experiential Learning Activity
Tutorials: In person. Check your schedule and room location on Carleton Central
  A1: 16:05 - 17:25, Fridays   B1: 10:05 - 11:25, Fridays
  A2: 11:35 - 12:55, Fridays   B2: 13:05 - 14:25, Thursdays
  A3: 11:35 - 12:55, Thursdays   B3: 14:35 - 15:55, Fridays
Student hours: A list of teaching assistants and their contact/student hours information will be posted once the course starts

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Calendar Description

Operating system implementation course stressing fundamental issues in design and how they relate to modern computer architectures. Assignments involve the modification and extension of a multitasking operating system.

Course Website: Please use Brightspace as the primary source of information, where important instructions can be found that must be followed. For information about Carleton's academic year, including registration and withdrawal dates, see Carleton's Academic Calendar.

Learning Outcomes

By the end of this course, students should:

1. Have a strong conceptual model of how an operating system works that can facilitate software development/testing and answer questions pertaining to an operating system's everyday use.

2. Be able to write/modify C code that uses low-level Linux services and implement simple Linux kernel extensions (modules).

3. Understand the basic use and architecture of virtual-machine based and container based cloud architectures.

Note that in order to achieve these objectives students should have come into this course with a strong background in C programming and general application development.

Important dates and deadlines can be found here: link, including class suspension for fall, winter breaks, and statutory holidays.

Assessments

Grade Breakdown and Due Dates

COMPONENT	PERCENTAGE	COMMENT/DATE
Tutorials	16%	best 8 out of 9
Assignments	20%	Tentative : FEB02, FEB23, MAR16, APR06
Mini-quizzes	9%	Online after each topic
Midterm exam	20%	Closed book, in class for A (FEB12), TBD for B
Final exam	35%	Closed book, during the final exam period
Bonus marks	N/A	See below*

Due dates for assignments and tutorials are tentative. Final dates will be made available on Brightspace. They will be no earlier than listed above. Tutorial submissions are usually due four days after the tutorial date.

The mini-quizzes are designed to make sure you are following along and attending the lectures (or watching the recorded lectures) every week. There will be 2 - 3 multiple-choice questions each. You will only have a time window of several days to complete each mini-quiz.

Alternative grading schemes might be applied at the end of the term so there is a chance that your final grade is higher than calculated by strictly following the default scheme above. Tutorials are an important part of the learning process and basis for assessment (i.e., assignments and exams).

There are two types of bonus marks: An assignment may have a bonus question at the end, which is usually more challenging (to be determined). The instructor may also grant bonus marks to students who have been active (e.g., during student hours or on MS Teams) based on the instructor's observation (no more than 2% beyond the 100%). Interactions irrelevant to course topics (e.g., clarification on logistics) are NOT counted.

Note to Section B students: the midterm is in person so you need to be able to make it to the campus to write it. We are trying to schedule it for Week 6 (the week of Feb 10, before the winter break). Once Scheduling and Examination Services confirm the date, we will inform you.

Communication

Section A lectures will be in person and recorded. Recorded lectures will be made available to both sections A and B on Brightspace. Course discussions will be on Microsoft Teams. Such discussions may include but are not limited to assignment clarifications, ad-hoc announcements, and tutorial discussions. All work submissions except for writing the two exams, as well as important (e.g., grading-related) announcements, course material and grade posting, will be through Brightspace. More detailed instructions will be provided in a Brightspace announcement at the beginning of the term.

Extended student hours: Every one or two weeks, an online Q&A session will be held online with the instructor. This is similar to regular student hours except that multiple students will be admitted into the session (like a class), and the focus is on lecture topics, e.g., you can ask the instructor to re-explain a concept. For ad hoc technical problems, e.g., how to set up the environment for a tutorial, please attend a TA's student hours. The meeting time varies as intended and will be announced so that if it does not work for a student, it likely will the next time. Priority will be given to students in Section B (if there are too many participants).

Topics Covered

Tentative lecture schedule by topics (subject to change):

- Introduction to Operating Systems (Week 1)

- OS Abstractions (Week 2)

- Facilities for Users/Programmers (Week 3)

- File Systems and Storage Management (Week 4 and Week 5)
  (Week 6: Midterm exam; Week 7: Winter Break)

- Inter-Process Communication and Concurrency (Week 8)

- I/O Management and Kernel Modules (Week 9)

- Memory Management (Week 10)

- Containerization and Virtualization (Week 11)

- Security and Additional OS Topics (Week 12 and Week 13)

Important dates and deadlines can be found here, including class suspension for the winter break, and statutory holidays.

Learning Materials

The course will be using the textbook **Operating Systems: Three Easy Pieces**. The chapters of this textbook are available for free online; you can also buy a full epub, PDF, or paper copy if

you wish.

This course focuses much more on reading/modifying code rather than writing code. Thus, John Aycock's book, Reading and Modifying Code, is worth reading to better understand how reading code differs from writing code.

Students are not required to purchase textbooks or other learning materials for this course.

Late and Missed Work Policies

NO submission by email will be accepted without any exception (so please do not email your work to a TA or the instructor).

Assignments/tutorials submissions are handled electronically through Brightspace - an assignment submitted even one minute after the deadline is late and will not be accepted by the system. Any extenuating situation or academic accommodation request must be received by the instructor within 24 hours following the due time, and will be considered on a case-by-case basis. Technical problems do not exempt you from this requirement, so if you wait until the last minute and then have issues with your connection, you will still receive a mark of zero. Consequently, you are advised to submit your work several hours in advance of the due time. You can also submit a work-in-progress version and override it with the completed version before the deadline. Contact the TAs/instructor in case of any problems.

Format errors, missing files, and other technical/non-technical upload issues will not constitute the justification for another attempt. Only what has been uploaded by the due time will be graded. Consequently, after you upload your submission to Brightspace you should download it immediately for verification and ensure that all needed files are there in the right format.

Please use the following form to submit your accommodation request: TO BE UPDATED. You are only allowed to use this form twice in the entire term, after which you will have to petition the Associate Dean's Office. Possible accommodations include acceptance with/without a penalty and weight adjustments, once a request is justified and approved.

If you are experiencing longer-term, chronic, or ongoing challenges, you need to use the long-term academic consideration form at: https://payments.carleton.ca/registrar/long-term-academic-considerations-for-coursework/. This is not what the instructor can handle with grading adjustments.

Note: Extensions can only be granted up to before the solutions are discussed in class (even in extenuating circumstances), as this would affect everyone. Beyond that, alternative accommodations, such as adjusting grade component weights may be considered, e.g., if you have a medical emergency.

Authorized and Unauthorized Collaboration

Collaboration is allowed for the assignments and **prohibited** for the exams/quizzes. Collaboration, wherever allowed, should be clearly acknowledged, by mentioning the name(s) of who you have collaborated with. While you may get help from others and even collaboratively solve technical

problems, the **code and answers submitted** should all be your own work. For example, you may not divide an assignment into parts, give a part to another student or anyone else to solve, and then submit that work as your own. You have to have participated in the creation of every part of your submitted work. An easy way to make sure this happens is to never share files regarding coursework or copy and paste answers. Instead, only meet together (in person or virtually) to work on an assignment (e.g., to discuss your understanding/confusion) and then **separate** to write up your own solutions.

Similarity between submitted assignments that has not been appropriately documented will be treated as plagiarism - the same as copying on a midterm or a final - and will be submitted to the Dean for disciplinary action. If you are unsure of the expectations regarding academic integrity (how to use and cite references, if collaboration with lab- or classmates is permitted and, if so, to what degree), then you must ASK the instructor.

Sharing assignment or exam specifications or posting them online (to sites like Chegg, CourseHero, OneClass, etc.) is ALWAYS considered academic misconduct. You are never permitted to post, share, or upload course materials without explicit permission from the instructor. Academic integrity offences are reported to the office of the Dean of Science.

Notes on AI Tools. The assessed activities in this course were designed to be completed by either an individual alone or multiple students in this class. Unless it is explicitly stated otherwise, the use of any AI tools will be considered academic misconduct. This includes, but is not limited to, chatbots (e.g., ChatGPT, Google Bard, Bing Chart), research assistants (e.g., Elicit), and image generators (e.g., Stable Diffusion, Dall-E), etc. An exception to the above rule is made for automated grammar and punctuation checking tools (such as Grammarly).

References to any material you use but did not originate must use the IEEE/APA/MLA citation style (URLs are okay for online articles). Failure to reference materials correctly can result in severe penalties, and the use of manufactured (i.e., falsified) or misleading references will be treated as evidence of plagiarism and considered academic misconduct. Everything you submit for evaluation (i.e., assignments, quizzes, tutorials, examinations, etc.) must be the result of your own work and only your own work. If you use more than five consecutive words from a single source without providing a valid reference, then that is considered plagiarism and an example of academic misconduct.

Academic Accommodations and Regulations

Carleton is committed to providing academic accessibility for all individuals. You may need special arrangements to meet your academic obligations during the term. The accommodation request processes are outlined on the Academic Accommodations website (https://students.carleton.ca/course-outline/).

Undergraduate Academic Advisors
The Undergraduate Advisors for the School of Computer Science are available in Room 5302HP; or by email at scs.ug.advisor@cunet.carleton.ca. The undergraduate advisors can assist with information about prerequisites and preclusions, course substitutions/equivalencies, understanding your academic audit and the remaining requirements for graduation. The undergraduate advisors will also refer students to appropriate resources such as the Science Student Success Centre, Learning Support Services and Writing Tutorial Services.

SCS Computer Laboratory

Students taking a COMP course can access the SCS computer labs. The lab schedule and location can be found at: https://carleton.ca/scs/tech-support/computer-laboratories/. All SCS computer lab and technical support information can be found at: https://carleton.ca/scs/tech-support/. Technical support staff may be contacted in-person or virtually, see this page for details: hrefhttps://carleton.ca/scs/tech-support/contact-it-support/https://carleton.ca/scs/tech-support/contact-it-support/.

Statement on Academic Integrity

Misconduct in scholarly activity will not be tolerated and will result in consequences as outlined in Carleton University's Academic Integrity Policy (see here). A list of standard sanctions in the Faculty of Science can be found here. Additional details about this process can be found on the Faculty of Science Academic Integrity website. Students are expected to familiarize themselves with and abide by Carleton University's Academic Integrity Policy.

Student Rights and Responsibilities

Students are expected to act responsibly and engage respectfully with other students and members of the Carleton and the broader community. See the 7 Rights and Responsibilities Policy for details regarding the expectations of non-academic behaviour of students. Those who participate with another student in the commission of an infraction of this Policy will also be held liable for their actions.

Student Concerns

If a concern arises regarding this course, your first point of contact is me: Email or message me on MS Teams and I will do my best to address your concern. If I am unable to address your concern, the next points of contact are: studentconcerns@scs.carleton.ca (the School of Computer Science), and finally (if still not resolved) ODScience@carleton.ca (the Office of the Dean of Science)
Note: You can also bring your concerns to Ombuds services.