

Last updated: December 25, 2023 (preliminary version, subject to change)

# COMP 3000 (WINTER 2024)

## OPERATING SYSTEMS

### COURSE INFORMATION

**Class time:** Section A: 10:05 - 11:25, Mondays and Wednesdays

Section B: 19:35 - 20:55, Tuesdays and Thursdays

**Instructor:** [Lianying Zhao](mailto:Lianying.Zhao@scs.carleton.ca) (firstname.lastname@scs.carleton.ca)

**Location:** Refer to the your time table on Carleton Central

**Office hours:**

A list of teaching assistants and their contact/office hours information will be posted once the course starts.

**Tutorials:** Check your schedule and room location on Carleton Central

A1: 11:35 - 12:55, Thursdays

A2: 16:05 - 17:25, Thursdays

A3: 10:05 - 11:25, Thursdays

B1: 11:35 - 12:55, Fridays

B2: 08:35 - 09:55, Fridays

B3: 10:05 - 11:25, Fridays

**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](#).

### COURSE 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.

**Includes:** Experiential Learning Activity

**Precludes** additional credit for SYSC 4001

**Prerequisites:** COMP 2401 with a minimum grade of C- and COMP 2402

Note: this means a strong C programming background is required

## LEARNING OUTCOMES

By the end of this course, students should:

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

## GRADING SCHEME

2%: Lecture participation \*

18%: Tutorial participation (best 8 out of 9 in total)

20%: Assignments (4 in total)

25% Midterm exam (in class, **closed book**) **Feb 14<sup>th</sup>** (A), **Feb 15<sup>th</sup>** (B)

35%: Final Exam (during the final exam period, **closed book**)

Assignment and tutorial due dates will be made available in [Brightspace](#). Tentative dates for assignments: FEB04, FEB25, MAR19, APR07. Finalized due dates will be no earlier. Tutorial submissions are usually due four days after the tutorial date.

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).

\*: You can receive participation marks when asking good questions in various ways, e.g., during office hours, in the lecture channel on Teams, emailing the instructor. Note that the marks only depend on the **quality** of such interactions (NOT necessarily quantity), e.g., relevance to discussed topics, sufficient thinking. Other questions not about lecture

topics will not count, e.g., logistics. You may also respond to occasional pre-class polls to get part of the participation marks.

## COMMUNICATION

Lectures will be **in person only**. Course discussions will be on [Microsoft Teams](#). Such discussions may include but are not limited to assignment clarifications, polls, ad-hoc announcements, and tutorial discussions.

All work submissions (e.g., tutorials, assignments) except for writing the two exams, as well as important (e.g., grading-related) announcements, course material and grade posting, will be through Brightspace.

## TEXTBOOK

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.

## 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.

## IMPORTANT CONSIDERATIONS

Assignments/tutorials submissions are handled electronically (i.e., through Brightspace) and there is no "grace period" with respect to a deadline - 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 up to 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.

## AUTHORIZED AND UNAUTHORIZED COLLABORATION

Collaboration on all work is allowed **except** for the midterm and the final exams. Collaboration, however, should be clearly acknowledged, by mentioning the name(s) of who you have collaborated with.

For assignments, 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 (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 unauthorized 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. Penalties for such offences can be found on the ODS webpage: <https://science.carleton.ca/academic-integrity/>.

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 Chat), 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.

## POLICIES AND RESOURCES

**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](mailto: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: <https://carleton.ca/scs/tech-support/contact-it-support/>.

**Academic Accommodations.** Carleton is committed to providing academic accessibility for all individuals. Please review the academic accommodation available to students here: <https://students.carleton.ca/course-outline/>.

**Student Academic Integrity Policy.** Every student should be familiar with the Carleton University Student Academic Integrity policy. A student found in violation of academic integrity standards may be sanctioned with penalties which range from a reprimand to receiving a grade of F in the course, or even being suspended or expelled from the

University. Examples of punishable offences include plagiarism and unauthorized collaboration. Any such reported offences will be reviewed by the office of the Dean of Science. More information on this policy may be found on the ODS Academic Integrity page: <https://carleton.ca/registrar/academic-integrity/>.

**Plagiarism.** As defined by Senate, "plagiarism is presenting, whether intentional or not, the ideas, expression of ideas or work of others as one's own". Such reported offences will be reviewed by the office of the Dean of Science. More information and standard sanction guidelines can be found here: <https://science.carleton.ca/students/academic-integrity/>.

**Unauthorized Collaboration.** Senate policy states that "to ensure fairness and equity in assessment of term work, students shall not co-operate or collaborate in the completion of an academic assignment, in whole or in part, when the instructor has indicated that the assignment is to be completed on an individual basis".

**Doctor's note or medical certificate:** In effect for Winter 2023 term, in place of a doctor's note or medical certificate, students are advised to complete the **self-declaration form** [available on the Registrar's Office website](#) to request academic accommodation for missed course work including exams and assignments.