Carleton University
School of Computer Science

Last updated: January 4, 2022 (preliminary version, subject to change)

COMP 3000 (WINTER 2022)
OPERATING SYSTEMS

GENERAL INFORMATION

Class time: online (via Zoom and Teams)
Section A: 08:35 - 09:55, Tuesdays and Thursdays
Section B: 11:35 - 12:55, Mondays and Wednesdays

Instructor: Lianying Zhao (firstname.lastname@scs.carleton.ca)

Location: Refer to the public class schedule

Office hours (online):

Instructor:	Thu. 15:00 – 16:00 (or by appointment)
TA information to be added	

Tutorials (online):

A1: 14:35 - 15:55, Tuesdays
A2: 11:35 - 12:55, Thursdays
A3: 11:35 - 12:55, Fridays
B1: 10:05 - 11:25, Fridays
B2: 10:05 - 11:25, Tuesdays
B3: 14:35 - 15:55, Thursdays

Course Website: Please use Brightspace as the primary source of information, where important instructions can be found that must be followed, e.g., to set up a mandatory online discussion channel used throughout the course.

Preclusions: SYSC 3001, SYSC 4001

Prerequisites: COMP 2401 (C- or above), and one of (COMP 2402, SYSC 2100).
Note: this means a strong C programming background is required

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

COURSE 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.

LEARNING OUTCOME

By the end of this course, students should:

- Have a strong conceptual model of how an operating system works that can facilitate software development/debugging 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 (not attendance) *

18%: Tutorial participation (9 in total)

20%: Assignments (4 in total)

25% Midterm exam (in class, open book) **Mar 1st** (A) **Feb 28th** (B)

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

Tentative due dates will be made available in Brightspace.

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). This will be explained further in the first class.

*: You can receive participation marks when asking good questions 1) during lecture, 2) by emailing the instructor, or 3) during office hours with 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. You may also react to occasional polls during lecture to get part of the participation marks.

COMMUNICATION

Lectures will be conducted via Zoom. Recorded lectures are available afterwards. Discussions including office hours will be on Microsoft Teams. All work submissions (tutorials, assignments, and exams), as well as important announcements, 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
- OS Abstractions
- Facilities for Users/Programmers
- File Systems and Storage Management
- Inter-Process Communication and Concurrency
- I/O Management and Kernel Modules
- Memory Management
- Containerization and Virtualization
- Security Considerations

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. 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 attempt to submit your work at least one hour in advance of the due date and time. 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 date and time will be graded. Consequently, after you upload your submission to Brightspace you should re-download it immediately 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.

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 never share files regarding coursework or copy and paste answers into email. Instead, meet together (virtually) to work on an assignment 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.

Sharing assignment or exam specifications or posting them online (to sites like Chegg, CourseHero, OneClass, etc.) is considered academic misconduct. You are never permitted to post, share, or upload course materials without explicit permission from your 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/.

POLICIES AND RESOURCES

For information about Carleton's academic year, including registration and withdrawal dates, see Carleton's Academic Calendar.

Undergraduate Academic Advisor. The Undergraduate Advisor for the School of Computer Science is available in Room 5302C HP; 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. SCS students can access one of the designated labs for your course. The lab schedule 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/technical-support/. Technical support is available in room HP5161 Monday to Friday from 9:00 until 17:00 or by emailing SCS.Tech.Support@cunet.carleton.ca.

Pregnancy Obligation. Please contact your instructor with any requests for academic accommodation during the first two weeks of class, or as soon as possible after the need for accommodation is known to exist. For more details, visit Equity Services.

Religious Obligation. Please contact your instructor with any requests for academic accommodation during the first two weeks of class, or as soon as possible after the need for accommodation is known to exist. For more details, visit Equity Services.

Academic Accommodations for Students with Disabilities If you have a documented disability requiring academic accommodations in this course, please contact the Paul Menton Centre for Students with Disabilities (PMC) at 613-520-6608 or pmc@carleton.ca for a formal evaluation or contact your PMC coordinator to send your instructor your Letter of Accommodation at the beginning of the term. You must also contact the PMC no later than two weeks before the first in-class scheduled test or exam requiring accommodation (if applicable). After requesting accommodation from PMC, meet with your instructor as soon as possible to ensure accommodation arrangements are made. For more details, visit the Paul Menton Centre website.

Survivors of Sexual Violence. As a community, Carleton University is committed to maintaining a positive learning, working and living environment where sexual violence will not be tolerated, and survivors are supported through academic accommodations as per Carleton's Sexual Violence Policy. For more information about the services available at the university and to obtain information about sexual violence and/or support, visit: carleton.ca/sexual-violence-support

Accommodation for Student Activities. Carleton University recognizes the substantial benefits, both to the individual student and for the university, that result from a student participating in activities beyond the classroom experience. Reasonable accommodation must be provided to students who compete or perform at the national or international level. Please contact your instructor with any requests for academic accommodation during the first two weeks of class, or as soon as possible after the need for accommodation is known to exist. For more details, see the policy.

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 awarded penalties which range from a reprimand to receiving a grade of *F* in the course or even being expelled from the program or University. Examples of punishable offences include: plagiarism and unauthorized co-operation or collaboration. Information on this policy may be found here.

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. Standard penalty guidelines can be found here.

Unauthorized Co-operation or 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". Please refer to the course outline statement or the instructor concerning this issue.