

Distributed OS: Fall 2021 Course Outline

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Course Information

- **Course Number:** COMP 4000/5102
- **Term:** Fall 2021
- **Title:** Distributed Operating Systems
- **Institution:** Carleton University, School of Computer Science
- **Instructor:** Anil Somayaji (<http://people.scs.carleton.ca/~soma>) (anil.somayaji at

carleton.ca). Office hours Tuesdays and Thursdays 11:30-12:30 and appointment.

- **Teaching Assistant:** William Findlay (WilliamFindlay at cmail.carleton.ca).
- **Meeting Time:** Mon. & Wed. 18:05-19:25 AM, online via Zoom
- **Course Website:** <https://homeostasis.scs.carleton.ca/wiki/index.php>
/Distributed_OS:_Fall_2021

Official Course Descriptions

COMP 4000: An advanced course emphasizing the principles of distributed operating systems including networking protocols, distributed file systems, remote IPC mechanisms, graphical user interfaces, load balancing, and process migration. Case studies include current "standards" as well as novel systems under development. Prerequisite(s): one of COMP 3203 or SYSC 4602, and one of COMP 3000, SYSC 3001, SYSC 4001.

COMP 5102: Design issues of advanced multiprocessor distributed operating systems: multiprocessor system architectures; process and object models; synchronization and message passing primitives; memory architectures and management; distributed file systems; protection and security; distributed concurrency control; deadlock; recovery; remote tasking; dynamic reconfiguration; performance measurement, modeling, and system tuning. Prerequisite(s): COMP 3000 and COMP 3203 or equivalent.

Communication

The main wiki page is the canonical source of information on this course. Please refer to it for updates. Brightspace (<http://brightspace.carleton.ca>) will be used for submitting written work and for posting grades and other private information. Asynchronous interactions (announcements and discussions) will happen through Teams (<https://teams.microsoft.com>). Synchronous interactions, including classes and office hours, will be carried out online using Zoom. (The Zoom link will be posted to Brightspace and Teams.)

Required Textbooks/Software

There are no required textbooks or software for this course. Instead we will be reading research papers which will be linked to from the wiki. While many of these papers will be available directly via web search, some will be behind paywalls. In this case there will be alternate links to those pages that go through the Carleton Library's proxy.

Grading

Students enrolled in COMP 4000 (undergraduates) will receive the best grade as calculated by one of three grading schemes. Students enrolled in COMP 5102 (mostly graduate students) are not eligible for the "Exams only" grading scheme. In other words, the project is optional for undergraduates and mandatory for graduate students.

Note that other grading schemes may be used to calculate final grades; the grading schemes below represent the minimum grade students will receive.

Everyone

- 10% Attendance
- 15% Reading quizzes/responses
- 15% Group Reports
- 10% Experiences (September 28th and October 19th)

Exams only

- 20% Midterm (October 21st, in class)
- 30% Final (during the Final Exam Period)

Tests and Project

- 10% Midterm (October 21st, in class)
- 15% Final (during the Final Exam period)
- 5% Project Proposal (October 30th)
- 20% Final Project (due 5 days after the Final Exam)

Project only

- 10% Project Proposal (November 4th)
- 40% Final Project (due 5 days after the Final Exam)

Class Participation & Attendance

You are expected to attend every (virtual) class for this course. Moreover, you are expected to participate in each class.

Attendance will be taken every class. If you are late to class, you will only receive partial marks for attending that class.

This participation part of your grade will be based upon the degree to which you are an active participant in class. To receive full marks you will need to be a regular participant in class discussions.

Reading Quizzes & Responses

Before each class you will need to demonstrate that you have made a reasonable attempt to read and understand the assigned readings. You can do this in one of two ways:

- a pre-class quiz, or
- a reading response.

Quizzes will be available through Brightspace and can be retaken once. They must be completed at least an hour before class. Alternately, reading responses should be submitted via Brightspace by the night before class (so, Monday or Wednesday evening).

Responses should be submitted as a text or PDF file and should be 250-500 words in length. Responses longer than 600 words may be marked off for verbosity. Your responses should say what you found interesting and what do you have questions about/were confused by. Where appropriate, they should also discuss the relationship between the papers of the week and other work that you know about (including those covered earlier in class). *Do not summarize the readings.* Instead you should be telling us what you got out of these papers, good and bad. Please also tell me what issues you'd like to learn more about, either in class or potentially through later readings. Responses will be graded on a scale of 0 to 4, with a 4 being given for a response that has clear evidence that you made an effort to read and understand all of the assigned readings.

To participate in group discussions you will need to score at least 3/4 on the pre-class quiz or reading response. If you score lower you will not be assigned to a group during class time. Thus, if you find a reading particularly challenging or hard to understand, you may want to submit a reading response rather than take a quiz. In your reading response be sure to make clear what parts of the readings you had difficulties with and why.

Group Reports

On a regular basis, the class will be divided into groups. Each group will be responsible for recording the discussion around one or more papers that were discussed during the week. The recorded discussion should be in a form such that someone who has not read the paper or participated in the discussion can understand it. Thus, the discussion summary should also include a summary of the paper in some form.

If you miss class or you don't get 3/4 on the on the class's reading quiz/response, you may do a late group report with at least one other student in a similar situation.

Implementation Experiences

During the semester you will be required to submit reports on two implementation experiences. These experiences will center around kubernetes and will involve you configuring and running container-based environments and applications. Work will be graded on the basis of goals achieved. In other words, you will be able to complete a simpler task to achieve a lower grade or you can complete a harder task for a higher one.

Project

The project may be a literature review of a specialized area of computer science related to distributed operating systems, a research proposal on a problem related to distributed operating systems, or an experience report on setting up and running a distributed application or piece of infrastructure. A research proposal should be thought of as an abbreviated literature review paper combined with a description of potential future work that would fill a gap in the covered literature.

You may choose to follow up on your proposal and actually implement what you propose; given the implementation complexity of most research problems in distributed operating systems, though, such an implementation is strictly optional (but may be advisable if you wish to make your project publishable).

For literature reviews or research proposals, your project outline should consist of a title, abstract, an argument outline, and at least ten references that you plan to cite in your final project. For experience reports, it should be a description of what you plan to implement and how, including an outline of expected

challenges and milestones.

You should run ideas for your project by Prof. Somayaji before writing your proposal before you spent time making your outline.

Collaboration

Collaboration on all work is allowed except for the midterm and final exams. Collaboration, however, should be clearly acknowledged. Specifically, co-authored works should be marked as such. When co-authored, all authors of reading responses and projects will get the same grade, unless there is reason to believe that some co-authors did not in fact contribute significantly to the submitted work. Co-authored contributions may get different grades depending upon the relative contribution of the different authors; however, the default here will also be to give all authors the same grade.

It is **essential** that outside references be cited appropriately. Proper citation format should be followed except where more relaxed forms are specifically allowed.

Plagiarism or intellectual dishonesty of any kind is strictly forbidden. In other words, it should always be clear what is your work and what is the work of others. If anything you submit is, in part or whole, very similar in content or structure to that of work produced by someone else, you are plagiarizing. This includes figures.

Think of plagiarism as a kind of unauthorized collaboration. Don't do it. Plagiarism and other instructional offenses will be reported to the Dean of Science for disciplinary action, as per university guidelines.

University Policies & Resources

For information about Carleton's academic year, including registration and withdrawal dates, see [Carleton's The Academic Year](https://calendar.carleton.ca/academicyear/) (<https://calendar.carleton.ca/academicyear/>).

Undergraduate & Graduate Academic Advisor

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

Pregnancy, Religious, or other Obligation

For pregnancy, religious, or other equity-related obligations 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](https://carleton.ca/womensstudies/resources-and-links/equity-services/) (<https://carleton.ca/womensstudies/resources-and-links/equity-services/>).

Academic Accommodations for Students with Disabilities

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 \(<http://carleton.ca/pmc>\)](http://carleton.ca/pmc).

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 is 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 [Sexual Assault Support Services \(<https://carleton.ca/sexual-violence-support>\)](https://carleton.ca/sexual-violence-support).

Accommodation for Student Activities

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 \(<https://carleton.ca/senate/wp-content/uploads/Accommodation-for-Student-Activities-1.pdf>\)](https://carleton.ca/senate/wp-content/uploads/Accommodation-for-Student-Activities-1.pdf).

Student Academic Integrity 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 \(<https://carleton.ca/registrar/academic-integrity/>\)](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. Standard penalty guidelines can be found [here \(<https://science.carleton.ca/academic-integrity/>\)](https://science.carleton.ca/academic-integrity/).

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 see above for the specific collaboration policy for this course.

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This page was last edited on 2 September 2021, at 14:43.

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