

# Course Syllabus

[Jump to Today](#)

 [Edit](#)

This course website is still under construction and this syllabus has not yet been approved by the department. All details are subject to change.

*The University of Toronto is committed to equity, human rights and respect for diversity. All members of the learning environment in this course should strive to create an atmosphere of mutual respect where all members of our community can express themselves, engage with each other, and respect one another's differences. The University of Toronto does not condone discrimination or harassment against any persons or communities.*

## Logistics

The instructor and course coordinator is Mario Badr. All course announcements are made on Quercus and you are responsible for reading all announcements made in this course.

For *personal questions*, please email [csc369-2023-01@cs.toronto.edu](mailto:csc369-2023-01@cs.toronto.edu) from your University of Toronto email address. **Do not email your instructor directly**—we are using a separate email account to ensure that every email is properly recorded and answered as smoothly as possible. Please use an appropriate subject line and include your full name, UTORid, and student number in the body of the email. We try to respond to emails within 3 business days. However, it may take longer, especially near due dates. If you do not hear back after a few days, please do not hesitate to send a follow-up email.

For course-related questions, please post all of your questions about the course material and assignments on Piazza so that everyone can benefit from your questions. See below for more details on using Piazza.

## Attending lectures

All lectures start at 10 minutes past the hour at the place and time specified on ACORN. Lecture attendance is not mandatory, but recommended. If the lecture hall supports it, recordings will be made available on Quercus. Please see below for our policy on lecture recordings.

The first lecture (L00) will be on Monday, January 9th, 2023. Please note that there are three lectures in Week 1, where L02 takes place on Friday, January 13th in LM161. The Fridays in Week 2 onward are tutorials.

## Attending Tutorials

All tutorials start at 10 minutes past the hour at the place and time specified on ACORN. Tutorial attendance is not mandatory, but recommended. Tutorials are facilitated by Teaching Assistants and give you the opportunity to work on exercises that help with assignments and supervised assessments.

The first tutorial is on Friday, January 20th, 2023. The tutorial schedule can be found below.

Tutorial Schedule

Tutorial Number	Date
T01	January 20th, 2023
T02	January 27th, 2023
T03	February 3rd, 2023
T04	February 10th, 2023
Midterm	February 17th, 2023
T05	March 3rd, 2023
T06	March 10th, 2023
T07	March 17, 2023
T08	March 24th, 2023
T09	March 31st, 2023

## Attending Office Hours

Each week, the course coordinator holds office hours to provide an informal setting for students to drop in and ask questions or just chat about the course material. Office hours are typically held on Mondays and Wednesdays from 1:10 to 2:00 pm in BA4238 (some exceptions, like reading week, may apply). The first office hour is on Monday, January 9th, 2023. Other office hours, hosted by an instructor or a teaching assistant, may be added based on demand and availability. Please check the announcements regularly for updates.

Our office hours are *student-driven*, meaning the instructor won't have any material prepared, and instead the discussion is based on whatever questions you'd like to ask. Office hours are also *group-based*, meaning we stick to questions that aren't specific to any particular student, but rather to course concepts and answers that every student can benefit from.

## Using Piazza

The course uses Piazza as an online discussion and forum for questions about course content. This way, if one student has a question about the material, other students can see the question and

(eventual) answer. Students are encouraged to answer questions if they know the answer (and their answer may be endorsed by the instructor). However, **Piazza must not be used to share solutions** (including incorrect and/or partial solutions) to any of the assessments in the course.

While we strive to answer questions in a timely manner, students should not think of Piazza as an "instant messaging" connection to the teaching team. The closer to the deadline you ask a question, the less likely we are able to answer in time. So please ask questions in advance.

When asking a question, please use Piazza's search to first check to see it has already been asked. If it has not yet been asked, please use an appropriate title. For example, if asking a question regarding Assignment 1, an example of a good title might be: "Behaviour of yielding to self?", while an example of a bad title is: "CSC369\_ThreadYieldTo". The former is a good title because it describes the problem, while the latter only indicates the overall function (but not the question). You should, however, include the function name (or error message, or... etc.) as *text* in the body so that it may be easily searched in Piazza. Well formed and formatted questions are typically prioritized by the teaching team for answering.

## Using the Teaching Labs

We assume that students in this course have access to, and are familiar with, the teaching labs in the Department of Computer Science. If this is not the case, please contact us immediately. There is an [Introduction For New Computer Science Students On Teaching Labs](http://www.teach.cs.toronto.edu/resources/intro_for_new_students.html) ([http://www.teach.cs.toronto.edu/resources/intro\\_for\\_new\\_students.html](http://www.teach.cs.toronto.edu/resources/intro_for_new_students.html)). In particular, we recommend learning how to [connect to the lab computers using SSH](https://www.teach.cs.toronto.edu/using_cdf/ssh) ([https://www.teach.cs.toronto.edu/using\\_cdf/ssh](https://www.teach.cs.toronto.edu/using_cdf/ssh)). All assignment submissions are expected to work (i.e., compile and run) on the lab computers; more details below.

## About the course

This course teaches students about how computers work at a very low level, and covers several important learning objectives from the [Computer Science Curricula](https://dl.acm.org/doi/book/10.1145/2534860) (<https://dl.acm.org/doi/book/10.1145/2534860>). Some of the key learning objectives from System Fundamentals include:

- Describe how computing resources are used by application software and managed by system software.
- Describe the difference between processes and threads.
- Summarize the range of mechanisms that can be employed at the operating system level to realize concurrent systems and describe the benefits of each.
- Explain the concept of virtual memory and how it is realized in hardware and software.
- Describe the choices to be made in designing file systems.

The high-level sequence of topics students learn in this course is:

1. Processes and Threads
2. Synchronization
3. Virtual Memory
4. File Systems

## Textbook

We will be using the free text [Operating Systems: Three Easy Pieces \(http://pages.cs.wisc.edu/~remzi/OSTEP/\)](http://pages.cs.wisc.edu/~remzi/OSTEP/) by Remzi H. Arpaci-Dusseau and Andrea C. Arpaci-Dusseau. You will also want a good C reference.

You may also find the following traditional text useful, but it is not required: [Modern Operating Systems \(http://www.pearsonhighered.com/educator/product/Modern-Operating-Systems/9780133591620.page\)](http://www.pearsonhighered.com/educator/product/Modern-Operating-Systems/9780133591620.page) by Andrew Tannenbaum.

## Assessments

For a list of all assessments in this course, see the Course Summary toward the bottom of the syllabus. The table below summarizes the assessments in the course. Additional information on each assessment type can be found below the table.

Assessment Summary

Assessment	Due Date/Date Held	Weight	Platform	Notes
Prep. Quizzes	Mondays, 9 am*	5%	Quercus	Best 10 of 11
Assignments	Tuesdays, 11 am	40%	MarkUs	Start early
Midterm	Friday, February 17th	15%	In Person	In the Exam Centre (EX310 and EX320)
Final Exam	To be announced.	40%	In Person	You must get at least 30% to pass the course

**\*With the exception of the first graded quiz, which is due by 9 am on Wednesday, January 11th**

### Preparation Quizzes

Each week there is an assigned reading from the (free, online) textbook. After reading the text, you must (individually) complete a Preparation Quiz on Quercus. There are 11 graded quizzes and each is worth 0.5% (best 10 of 11). The first graded Preparation Quiz is due Wednesday, January 11th before 9 am. All other quizzes are due on Mondays before 9 am. Late submissions are not accepted.

## Assignments

There are four assignments and each is worth 10%. Each assignment must be completed individually and submitted using MarkUs (login using your UTORid and password).

For your assignment to be graded, it must meet the minimum standards of a professional computer scientist. All files required to build the program must be submitted and the program must compile cleanly (i.e., without errors or warnings on the teach.cs lab machines). There is a 10% penalty if your program compiles with warnings.

Last minute difficulties (e.g., with submitting) can easily be avoided by ensuring all files are submitted well before the deadline. Compiling and testing your work on the teaching lab machines at intermediate stages will also avoid last minute problems. Submissions that are missing files or do not compile will receive a grade of 0.

Assignments are due at 11:00 am sharp on the due date. This means that **11:00:01 am is a late submission**. We recognize that unexpected problems sometimes make it difficult to submit assignments on time. For this reason, we accept late assignments with a penalty of 10% per hour up to 9 hours. For example, if your last file is uploaded between 11:00:01 and 11:59:59 am, then your submission will receive a 10% penalty on your overall grade. Please see the table below for a breakdown. Please note that penalties apply to the entire submission, not individual files.

Breakdown of Late Penalties for Assignments

Submission Time	Late Penalty
On time	No penalty
Up to 1 hour late	10%
Up to 2 hours late	20%
Up to 3 hours late	30%
Up to 4 hours late	40%
Up to 5 hours late	50%
Up to 6 hours late	60%
Up to 7 hours late	70%
Up to 8 hours late	80%
Up to 9 hours late	90%
After 9 hours late	100%

## Midterm

The midterm is a 45 minute in-person test held during class time (i.e., tutorial) on Friday, February 17th. Because the midterm is scheduled during class time, you should have no conflicts with the time

in your schedule. The midterm is written in the exam centre (EX310, EX320; you will be assigned a room based on your last name). If you are registered in LEC0101, you will write from 10:00 am to 11:00 am. If you are registered in LEC0201, you will write from 11:00 am to 12:00 pm.

If you miss the midterm, you may request special consideration (see the Special Consideration section below). You must submit this request as soon as possible, preferably before the midterm itself, but no later than one week from the midterm date.

## Final Exam

The Final Exam is scheduled by the Faculty of Arts and Science during the final assessment period. When it has been scheduled we will announce the date, time, and room of the final exam.

You must get 30% or above on the final exam to pass the course; otherwise, your final course grade will be no higher than 47%.

## Remark Requests

If an assignment or your midterm has been graded incorrectly, you may request a remark. For a remark to succeed, you must clearly and concisely express what you believe was incorrectly marked. Instructions on how to submit a remark request will be provided when grades are released for an assessment. Please note that remarking may increase the original grade, leave it as is, or decrease the original grade.

# Accommodations and accessibility services

The University provides academic accommodations for students with disabilities in accordance with the terms of the Ontario Human Rights Code. This occurs through a collaborative process that acknowledges a collective obligation to develop an accessible learning environment that both meets the needs of students and preserves the essential academic requirements of the University's courses and programs.

Students with diverse learning styles and needs are welcome in this course. If you have a disability that may require accommodations, please contact the [Accessibility Services on the St. George campus \(https://studentlife.utoronto.ca/department/accessibility-services/\)](https://studentlife.utoronto.ca/department/accessibility-services/) office as soon as possible.

# Special consideration and missed work

Students experiencing illness or other emergencies that prevent them from being able to complete homework on time, or write the midterm, can apply to the Course Coordinator for special consideration. You will be required to affirm that you are abiding by the [Code of Behaviour on Academic Matters \(https://governingcouncil.utoronto.ca/secretariat/policies/code-behaviour-academic-matters-july-1-2019\)](https://governingcouncil.utoronto.ca/secretariat/policies/code-behaviour-academic-matters-july-1-2019), in particular, to be aware that it is an offence:

*to engage in any form of cheating, academic dishonesty or misconduct, fraud or misrepresentation not herein otherwise described, in order to obtain academic credit or other academic advantage of any kind*

That is, you must be truly experiencing an emergency, and acknowledge that to falsely claim so is an academic offence.

**Applying does not guarantee that you will be granted special consideration.** To apply for special consideration, complete the [Special Consideration Form](https://q.utoronto.ca/courses/293636/files/24073303/download?download_frd=1) ↓ ([https://q.utoronto.ca/courses/293636/files/24073303/download?download\\_frd=1](https://q.utoronto.ca/courses/293636/files/24073303/download?download_frd=1)) and email it to the course account (see email above) *from your UofT email address*. You should also fill out the Absence Declaration Tool on [ACORN](https://acorn.utoronto.ca) (<https://acorn.utoronto.ca>).

**IMPORTANT:** *Submit your request soon as possible if you find yourself in such a situation. It is easier to resolve situations earlier rather than later.* If your emergency will affect your ability to complete coursework for more than a few days, or in multiple courses, we recommend you also talk to your registrar.

Note that **this procedure does NOT apply to the final exam**. Your Registrar handles all matters related to final exams.

## Religious Holidays

If a religious holiday will keep you from completing any assigned work, you should email the teaching team as soon as possible (but no later than two weeks before the due date) regarding an accommodation.

## Academic integrity

All suspected cases of academic dishonesty will be investigated following procedures outlined in the Code of Behaviour on Academic Matters. If you have questions or concerns about what constitutes appropriate academic behaviour or appropriate research and citation methods, please reach out. Note that you are expected to seek out additional information on academic integrity from me or from other institutional resources (for example, the [University of Toronto website on Academic Integrity](https://www.academicintegrity.utoronto.ca/) (<https://www.academicintegrity.utoronto.ca/>)).

Here are a few guidelines to help you maintain academic integrity:

- Never look at another student's or group's assignment solution or idea for a solution, whether it is on paper or on the computer screen, and don't allow your solution to be viewed by or come into the possession of another student. Maintain absolute control of your work, including notes and partial solutions, at all times.
- We encourage you to discuss course concepts and to study for exams with other students, but

any work that is submitted should be your own. This also means that you should not be using any tools (e.g., software) that generate solutions for you.

- An academic offence may significantly slow your progress through your degree. It is better to submit a partially completed assignment and receive a low mark than to face an academic offence on your record.
- While it might be tempting to look for ideas and code in public repositories like GitHub, remember that using someone else's code and ideas without attribution, even if making some changes, is considered plagiarism.

## Copyright notice

Course materials prepared by the instructor are considered by the University to be an instructor's intellectual property covered by the Copyright Act, RSC 1985, c C-42. These materials are made available to you for your personal, and cannot be shared outside of the class or published (made publicly available) in any way. Posting course materials or any recordings you may make to other websites without the express permission of the instructor will constitute copyright infringement.

This notice applies to all course materials, including (but not limited to): course notes, lecture slides, lecture recordings, lecture and tutorial handouts, sample solutions, and assessment handouts, starter code, and solutions.

## Lecture recordings

This course, including your participation, may be recorded on video and made available to students in the course for viewing remotely after each session. Course videos and materials belong to your instructor, the University, and/or other sources depending on the specific facts of each situation and are protected by copyright. In this course, you are permitted to download session videos and materials for your own academic use, but you should not copy, share, or use them for any other purpose without the explicit permission of the instructor.

For questions about the recording and use of videos in which you appear, please contact us.

## Your course work

Work that you complete in this course may not be shared with other students or published. This policy is to both protect the intellectual property of course staff and to protect you from committing acts of academic dishonesty. For more information on this topic, see [the Department of Computer Science website \(https://web.cs.toronto.edu/undergraduate/portfolio-advice\)](https://web.cs.toronto.edu/undergraduate/portfolio-advice).









[GitHub \(https://www.github.com\)](https://www.github.com) is a popular option for computer science students and professionals to both collaborate in teams and publish their work online, including to develop a portfolio for potential employers. As we said in the *Academic Integrity* section, you should not put your work publicly on



GitHub. However, you may use GitHub's **private repositories** to store your own work, and work with a group on course assignments. (See [GitHub's instructions for creating a repository](https://docs.github.com/en/github/getting-started-with-github/create-a-repo) (<https://docs.github.com/en/github/getting-started-with-github/create-a-repo>) and select "Private" in Step 4.)

## Course Summary:

Date	Details	Due
Wed Jan 11, 2023	 <a href="https://q.utoronto.ca/courses/293636/assignments/967027">What is a process?</a> ( <a href="https://q.utoronto.ca/courses/293636/assignments/967027">https://q.utoronto.ca/courses/293636/assignments/967027</a> )	due by 9am
Mon Jan 16, 2023	 <a href="https://q.utoronto.ca/courses/293636/assignments/971938">What is concurrency?</a> ( <a href="https://q.utoronto.ca/courses/293636/assignments/971938">https://q.utoronto.ca/courses/293636/assignments/971938</a> )	due by 9am
Mon Jan 23, 2023	 <a href="https://q.utoronto.ca/courses/293636/assignments/972857">What is a lock?</a> ( <a href="https://q.utoronto.ca/courses/293636/assignments/972857">https://q.utoronto.ca/courses/293636/assignments/972857</a> )	due by 9am
Mon Jan 30, 2023	 <a href="https://q.utoronto.ca/courses/293636/assignments/972858">What is a semaphore?</a> ( <a href="https://q.utoronto.ca/courses/293636/assignments/972858">https://q.utoronto.ca/courses/293636/assignments/972858</a> )	due by 9am
Tue Jan 31, 2023	 <a href="https://q.utoronto.ca/courses/293636/assignments/963010">Assignment 1</a> ( <a href="https://q.utoronto.ca/courses/293636/assignments/963010">https://q.utoronto.ca/courses/293636/assignments/963010</a> )	due by 11am
Mon Feb 6, 2023	 <a href="https://q.utoronto.ca/courses/293636/assignments/973146">What is a scheduling policy?</a> ( <a href="https://q.utoronto.ca/courses/293636/assignments/973146">https://q.utoronto.ca/courses/293636/assignments/973146</a> )	due by 9am
Mon Feb 13, 2023	 <a href="https://q.utoronto.ca/courses/293636/assignments/973169">What is address translation?</a> ( <a href="https://q.utoronto.ca/courses/293636/assignments/973169">https://q.utoronto.ca/courses/293636/assignments/973169</a> )	due by 9am
Tue Feb 14, 2023	 <a href="https://q.utoronto.ca/courses/293636/assignments/963013">Assignment 2</a> ( <a href="https://q.utoronto.ca/courses/293636/assignments/963013">https://q.utoronto.ca/courses/293636/assignments/963013</a> )	due by 11am
Fri Feb 17, 2023	 <a href="https://q.utoronto.ca/courses/293636/assignments/963025">Midterm</a> ( <a href="https://q.utoronto.ca/courses/293636/assignments/963025">https://q.utoronto.ca/courses/293636/assignments/963025</a> )	due by 10am

Date	Details	Due
	(CSC369H1-S-LEC0101-20231)	
	 <a href="https://q.utoronto.ca/courses/293636/assignments/963025">Midterm (https://q.utoronto.ca/courses/293636/assignments/963025)</a> (CSC369H1-S-LEC0201-20231)	due by 11am
Mon Feb 27, 2023	 <a href="https://q.utoronto.ca/courses/293636/assignments/973170">What is paging? (https://q.utoronto.ca/courses/293636/assignments/973170)</a>	due by 9am
Mon Mar 6, 2023	 <a href="https://q.utoronto.ca/courses/293636/assignments/973171">Why smaller page tables? (https://q.utoronto.ca/courses/293636/assignments/973171)</a>	due by 9am
Tue Mar 7, 2023	 <a href="https://q.utoronto.ca/courses/293636/assignments/963011">Assignment 3 (https://q.utoronto.ca/courses/293636/assignments/963011)</a>	due by 11am
Mon Mar 13, 2023	 <a href="https://q.utoronto.ca/courses/293636/assignments/973173">What is a file? (https://q.utoronto.ca/courses/293636/assignments/973173)</a>	due by 9am
Mon Mar 20, 2023	 <a href="https://q.utoronto.ca/courses/293636/assignments/973174">What is file locality? (https://q.utoronto.ca/courses/293636/assignments/973174)</a>	due by 9am
Mon Mar 27, 2023	 <a href="https://q.utoronto.ca/courses/293636/assignments/973175">What is a flash-based solid state drive? (https://q.utoronto.ca/courses/293636/assignments/973175)</a>	due by 9am
Tue Mar 28, 2023	 <a href="https://q.utoronto.ca/courses/293636/assignments/962999">Assignment 4 (https://q.utoronto.ca/courses/293636/assignments/962999)</a>	due by 11am