

Course Syllabus

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 Edit

Computer Architecture (CSC368H1)

Fall 2025

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Communication

In this section, we outline the different ways that we will communicate in this course.

Announcements

All course announcements are posted on Quercus. You are responsible for reading all announcements made by the teaching team in a timely manner. And we highly recommend enabling notifications for Quercus announcements.

Email

If you have a personal question (i.e., the answer is only useful to you or contains personal details), email csc368-2025-09@cs.toronto.edu (<mailto:csc368-2025-09@cs.toronto.edu>). Please ensure that you share your UTORid in the body of your message. and allow 24-72 hours for response during regular business hours. We recommend reviewing our course policies (below) before sending an email.

We strongly recommend using your mail.utoronto.ca email address for all course-related communication. Please do not use Quercus' built-in communication tool (called "Inbox"). We do not monitor our Quercus inbox, so your message may never be seen.

Discussion forum

If you have a question related to course content, please use Quercus Discussions. As a courtesy to others (and the teaching team), please search to see if your question has already been posted. This is especially true closer to deadlines, where you may find many earlier discussions helpful to you.

Office hours

Throughout the term, Mario will host office hours on Wednesdays from 1:30 PM to 2:30 PM in his office (BA4270).

Course overview

This term, we learn about how the design of processors and computer systems has evolved over time in response to various trends in technology, applications, and market forces. As budding computer scientists, understanding the design trade-offs of computer hardware will enable you to make informed decisions in software.

The majority of the course focuses on the central processing unit (CPU). But many of these concepts connect with the more specialized processors we cover toward the end of the course, including graphics processing units (GPUs) and other accelerators. And the course concepts are a great complement to other upper-year courses in computer systems, like Operating Systems, Parallel Programming, and Compilers and Interpreters.

Textbook and references

Course textbook. The authoritative textbook on computer architecture is *Computer Architecture: A Quantitative Approach*. The fifth edition, our course textbook, is [available online](https://librarysearch.library.utoronto.ca/permalink/01UTORONTO_INST/14bjeso/alma991107424202506196) (https://librarysearch.library.utoronto.ca/permalink/01UTORONTO_INST/14bjeso/alma991107424202506196) for free through the UofT library. The book is currently in its [sixth edition](https://shop.elsevier.com/books/computer-architecture/hennessy/978-0-12-811905-1) (<https://shop.elsevier.com/books/computer-architecture/hennessy/978-0-12-811905-1>) and comes with a wealth of information that goes beyond what is covered in this course. You can also [download other content](https://www.elsevier.com/books-and-journals/book-companion/9780128119051) (<https://www.elsevier.com/books-and-journals/book-companion/9780128119051>) for free from the publisher, including reference appendices (some of which will be taught in this course).

Supplementary material. In addition to the textbook, we rely on other books as well as articles from journals and conference proceedings from academia. These are typically published by the ACM or IEEE, and offer insights into both the history and the cutting edge of computer architecture. We will refer to these papers throughout the course website. In terms of books, we will also refer to:

- [Memory Systems: Cache, DRAM, Disk](https://librarysearch.library.utoronto.ca/permalink/01UTORONTO_INST/14bjeso/alma991106885873606196) (https://librarysearch.library.utoronto.ca/permalink/01UTORONTO_INST/14bjeso/alma991106885873606196)
- [A Primer on Memory Consistency and Cache Coherence](https://librarysearch.library.utoronto.ca/permalink/01UTORONTO_INST/14bjeso/alma991107072362006196) (https://librarysearch.library.utoronto.ca/permalink/01UTORONTO_INST/14bjeso/alma991107072362006196)

Prerequisite material. Finally, the course relies on your understanding of prerequisite concepts. Textbooks, available for free through the UofT library, that may help you review these concepts include [Computer Organization and Design](#)

https://librarysearch.library.utoronto.ca/permalink/01UTORONTO_INST/14bjeso/alma991107422806706196) (CSC258H5) and [Digital Design and Computer Architecture](https://librarysearch.library.utoronto.ca/permalink/01UTORONTO_INST/14bjeso/alma991107424626406196) (https://librarysearch.library.utoronto.ca/permalink/01UTORONTO_INST/14bjeso/alma991107424626406196) (CSC258H1).

Lectures

Lectures introduce, build on, or reinforce fundamental computer architecture concepts. You are expected to prepare for each lecture ahead of time by completing a preparation module and quiz. And, while lecture attendance is not mandatory, we highly recommend you attend.

All lectures take place in BA1170 on Wednesdays, 11:00 AM to 1:00 PM. A more detailed lecture schedule, with a tentative sequencing of topics, is shown in the table below.

Lecture	Date	Tentative topic(s)
Lecture 1	September 3rd	Computing (e.g., instruction set architectures)
Lecture 2	September 10th	Storing (e.g., hardware caches, main memory)
Lecture 3	September 17th	Pipelining (e.g., processor pipelines)
Lecture 4	September 24th	Speculating (e.g., branch prediction)
Lecture 5	October 1st	Scheduling (e.g., out-of-order execution)
Midterm	October 8th	Weeks 1 to 5 (inclusive)
Lecture 7	October 15th	Connecting (e.g., crossbars, busses)
Lecture 8	October 22nd	Multi-core processors
No lecture (reading week)		
Lecture 9	November 5th	Vector processing

Lecture	Date	Tentative topic(s)
Lecture 10	November 12th	Graphics processors
Lecture 11	November 19th	Domain specific accelerators
Lecture 12	November 26th	Conclusion

If the lecture hall supports it, lecture recordings will be made available on Quercus. This is not a guarantee, and you should not rely on recordings in case they are not available (e.g., due to technical issues). Please see below for our policy on lecture recordings.

Technology can support student learning, but it can also become a distraction. Research indicates that multi-tasking during class time can have a negative impact on learning. Out of respect for your fellow students in this class, please refrain from using laptops or mobile phones for purposes unrelated to the class. Do not display any material on a laptop which may be distracting or offensive to your fellow students.

Tutorials

You complete tutorials with a partner in a computer lab. The tutorials may expose you to tools, like simulators, oft-used in academia (and, in some cases, industry). With these tools, you can conduct guided experiments to establish the skills needed to quantitatively evaluate hardware and software.

Tutorial logistics are shown in the table below.

Section	Day and time	Room
TUT0101	Friday, 11:00 AM to 12:00 PM	BA3175
TUT0102	Friday, 11:00 AM to 12:00 PM	BA3185
TUT0201	Friday, 12:00 PM to 1:00 PM	BA3175
TUT0202	Friday, 12:00 PM to 1:00 PM	BA3185

The tutorial schedule is shown in the table below.

Tutorial	Date
Tutorial 1	September 12th

Tutorial	Date
Tutorial 2	September 19th
Tutorial 3	September 26th
Tutorial 4	October 3rd
Tutorial 5	October 17th
Tutorial 6	November 7th
Tutorial 7	November 14th

Assessments

You can assess your learning in the course through a variety of ways. A summary of graded assessments is shown below, followed by more information about each assessment category. In addition to the graded assessments, you can assess your learning by completing the ungraded tutorials and problem sets made available throughout the term.

Assessment category	Count	Weight	Deadline(s)	Submission method
Preparations	9	9% (1% each)	Tuesdays before 3 PM	Quercus quiz
Tutorials	7	7% (1% each)	Mondays before 3 PM	MarkUs
Assignments	3	30% (5%, 10%, 15%)	Thursdays before 3 PM	MarkUs
Tests	1	15%	Wednesday, October 8th during lecture time	In-person
Final exam	1	39%	To-be-scheduled by Arts & Science	In-person

Preparations

Preparations are tasks you must complete before lecture, such as watching a video or reading a paper, and are assessed through a Quercus quiz.

Late policy: Any quiz may be submitted *one week* late without penalty. However, the lecture content expects that you have completed the preparation and are familiar with its content. Quizzes may not be submitted more than one week after the due date.

Tutorials

After completing a tutorial, you must submit a short report on MarkUs. Instructions on what to include in the report will vary by tutorial. The reports are due 3 days after the scheduled tutorial. For example, Tutorial 1 is scheduled for Friday, September 12th and its report is due on Monday, September 15th before 3:00 PM.

Late policy: Any tutorial report may be submitted *four days late* without penalty. For example, Tutorial 1 is scheduled for Friday, September 12th, its report is due on Monday, September 15th before 3:00 PM, and it may be submitted late, without penalty, by Friday, September 19th before 3:00 PM. Submissions are not accepted beyond this time, except in extenuating circumstances (see our course policies below).

Assignments

Assignments get progressively larger throughout the term as we learn more about computer architecture. Assignments 1 (worth 5%) and 2 (worth 10%) are completed individually. Assignment 3 (worth 15%) is completed in groups of 2 to 3.

Late policy: Any assignment may be submitted *four days late* without penalty. For example, Assignment 1 is due on Thursday, September 25th before 3:00 PM. It may be submitted late, without penalty, by Monday, September 29th before 3:00 PM. Submissions are not accepted beyond this time, except in extenuating circumstances (see our course policies below).

Tests

The midterm is an in-person test that is scheduled during your October 8th lecture time.

Missed test policy: We recommend reviewing our course policies below regarding accommodations and required documentation. If you will miss (or have missed) a test, you should email us **as soon as possible**.

Final examination

A final examination will be scheduled by the Faculty of Arts and Science during the final assessment period (i.e., between December 5th and December 23rd). It is worth 39% of your overall grade and covers all the course content. Please note that we (the teaching team) do not handle any accommodations related to the final exam. Please contact your college registrar, instead.

Policies and statements

Grading errors

If you believe there is a mistake in your grade, you can email us for clarification (csc368-2025-09@cs.toronto.edu (<mailto:csc368-2025-09@cs.toronto.edu>)) within two weeks of the grade being released to you. Your email should clearly and concisely describe why you believe your assessment was incorrectly graded. Please note that your inquiry may increase the original grade, leave it as is, or decrease the original grade, depending on the grading error or errors found.

Academic Integrity

All suspected cases of academic dishonesty will be investigated following procedures outlined in 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>). If you have questions or concerns about what constitutes appropriate academic behaviour or appropriate research and citation methods, please reach out to the course email address. Note that you are expected to seek out additional information on academic integrity from your instructor or from other institutional resources. For example, to learn more about how to cite and use source material appropriately and for other writing support, see the [U of T writing support website](http://www.writing.utoronto.ca/) (<http://www.writing.utoronto.ca/>). Consult the Code of Behaviour on Academic Matters for a complete outline of the University's policy and expectations. For more information, please see [A&S Student Academic Integrity](https://www.artsci.utoronto.ca/current/academic-advising-and-support/student-academic-integrity) (<https://www.artsci.utoronto.ca/current/academic-advising-and-support/student-academic-integrity>) and the [University of Toronto Website on Academic Integrity](https://www.academicintegrity.utoronto.ca/) (<https://www.academicintegrity.utoronto.ca/>).

Artificial Intelligence

In this course, you may use generative artificial intelligence (AI) tools, including ChatGPT, Microsoft Copilot, and GitHub Copilot, as learning aids and to help complete assignments. You will not be permitted to use generative AI on the midterm test or final exam. While some generative AI tools are currently available for free in Canada, please be warned that these tools have not been vetted by the University of Toronto and might not meet University guidelines or requirements for privacy, intellectual property, security, accessibility, and records retention. Generative AI may produce content which is incorrect or misleading, or inconsistent with the expectations of this course. These tools may even provide citations to sources that don't exist—and submitting work with false citations is an academic offense. These tools may be subject to service interruptions, software modifications, and pricing changes during the semester.

Generative AI is not required to complete any aspect of this course, and we caution you to not rely entirely on these tools to complete your coursework. Instead, we recommend treating generative AI as a supplementary tool only for exploration or drafting content. Ultimately, you (and not any AI tool) are responsible for your own learning in this course, and for all the work you submit for credit. It is your responsibility to critically evaluate the content generated, and to regularly assess your own learning

independent of generative AI tools. Overreliance on generative AI may give you a false sense of how much you've actually learned, which can lead to poor performance on the midterm test or final exam, in later courses, or in future work or studies after graduation.

Equity, diversity, and inclusion

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.

Students with disabilities or accommodation requirements

Students with diverse learning styles and needs are welcome in this course. If you have an acute or ongoing disability issue or accommodation need, you should register with Accessibility Services (AS) at the beginning of the academic year by visiting the [AS website](https://studentlife.utoronto.ca/departments/accessibility-services/) (<https://studentlife.utoronto.ca/departments/accessibility-services/>). Without registration, you will not be able to verify your situation with your instructors, and instructors will not be advised about your accommodation needs. AS will assess your situation, develop an accommodation plan with you, and support you in requesting accommodation for your course work. Remember that the process of accommodation is private: AS will not share details of your needs or condition with any instructor, and your instructors will not reveal that you are registered with AS.


Accommodation for specific medical circumstances

If you become ill and it affects your ability to do your academic work, email us right away. Normally, we will ask you for documentation in support of your specific medical circumstances. This documentation can be an Absence Declaration (via ACORN) or the University's Verification of Student Illness or Injury (VOI) form. The VOI indicates the impact and severity of the illness, while protecting your privacy about the details of the nature of the illness. If you cannot submit a VOI due to limits on terms of use, you can submit a different form (like a letter from a doctor), as long as it is an original document, and it contains the same information as the VOI (including dates, academic impact, practitioner's signature, phone and registration number). For more information on the VOI, please see <http://www.illnessverification.utoronto.ca> (<http://www.illnessverification.utoronto.ca/>). For information on Absence Declaration Tool for A&S students, please see <https://www.artsci.utoronto.ca/absence> (<https://www.artsci.utoronto.ca/absence>). If you get a concussion, break your hand, or suffer some other acute injury, you should register with Accessibility Services as soon as possible.


Accommodation for personal reasons

There may be times when you are unable to complete course work on time due to non-medical reasons. If you have concerns, email us or an advisor in your College Registrar's office; they can help you to decide if you want to request an extension or other forms of academic consideration. They may be able to email your instructors directly to provide a College Registrar's letter of support and connect you with other helpful resources on campus.

Mental health and well-being

Your mental health is important. Throughout university life, there are many experiences that can impact your mental health and well-being. As a University of Toronto student, you can access free mental health and wellbeing services at **Health & Wellness** (<https://studentlife.utoronto.ca/departments/health-wellness/>) such as same day counselling, brief counselling, medical care, skill-building workshops, and drop-in peer support. You can also meet with a Wellness Navigation Advisor who can connect you with other campus and community services and support. Call the mental health clinic at 416-978-8030 ext. 5 to book an appointment or visit <https://uoft.me/mentalhealthcare>  (<https://uoft.me/mentalhealthcare>) to learn about the services available to you.

You can also visit your College Registrar to learn about the resources and supports available: <https://www.artsci.utoronto.ca/current/academic-advising-and-support/college-registrars-offices> (<https://www.artsci.utoronto.ca/current/academic-advising-and-support/college-registrars-offices>)

If you're in distress, you can access immediate support: <https://uoft.me/feelingdistressed>  (<https://uoft.me/feelingdistressed>)

Quercus information

This Course uses the University's learning management system, Quercus, to post information about the course. This includes posting readings and other materials required to complete class activities and course assignments, as well as sharing important announcements and updates. New information and resources will be posted regularly as we move through the term. To access the course website, go to the U of T Quercus log-in page at <https://q.utoronto.ca>.

SPECIAL NOTE ABOUT GRADES POSTED ONLINE: Please also note that any grades posted are for your information only, so you can view and track your progress through the course. No grades are considered official, including any posted in Quercus at any point in the term, until they have been formally approved and posted on ACORN at the end of the course. Please contact me as soon as possible if you think there is an error in any grade posted on Quercus.

Course materials

Course materials are provided for the exclusive use of enrolled students. These materials should not be reposted, shared, put in the public domain, or otherwise distributed without the explicit permission of the

instructor. These materials belong to your instructor, the University, and/or other sources depending on the specific facts of each situation and are protected by copyright. Students violating these policies will be subject to disciplinary actions under the Code of Student Conduct.


Video recording and sharing

This course, including your participation, will be recorded on video and will be available to students in the course for viewing remotely and 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.

Course Summary:

Date	Details	Due
Tue Sep 9, 2025	 W02 Preparation (https://q.utoronto.ca/courses/415301/assignments/1566376)	due by 3pm
Mon Sep 15, 2025	 T01 Report (https://q.utoronto.ca/courses/415301/assignments/1566424)	due by 3pm
Tue Sep 16, 2025	 W03 Preparation (https://q.utoronto.ca/courses/415301/assignments/1566377)	due by 3pm
Mon Sep 22, 2025	 T02 Report (https://q.utoronto.ca/courses/415301/assignments/1566425)	due by 3pm
Tue Sep 23, 2025	 W04 Preparation (https://q.utoronto.ca/courses/415301/assignments/1566378)	due by 3pm
Thu Sep 25, 2025	 Assignment 1 (https://q.utoronto.ca/courses/415301/assignments/1565372)	due by 3pm
Mon Sep 29, 2025	 T03 Report (https://q.utoronto.ca/courses/415301/assignments/1566426)	due by 3pm
Tue Sep 30, 2025	 W05 Preparation (https://q.utoronto.ca/courses/415301/assignments/1566380)	due by 3pm

Date	Details	Due
Mon Oct 6, 2025	 T04 Report (https://q.utoronto.ca/courses/415301/assignments/1566427)	due by 3pm
Wed Oct 8, 2025	 Midterm (https://q.utoronto.ca/courses/415301/assignments/1565379)	due by 11am
Tue Oct 14, 2025	 W07 Preparation (https://q.utoronto.ca/courses/415301/assignments/1566408)	due by 3pm
Thu Oct 16, 2025	 Assignment 2 (https://q.utoronto.ca/courses/415301/assignments/1565374)	due by 3pm
Mon Oct 20, 2025	 T05 Report (https://q.utoronto.ca/courses/415301/assignments/1566428)	due by 3pm
Tue Oct 21, 2025	 W08 Preparation (https://q.utoronto.ca/courses/415301/assignments/1566409)	due by 3pm
Thu Oct 23, 2025	 Assignment 3 Group Declaration (https://q.utoronto.ca/courses/415301/assignments/1566469)	due by 3pm
Tue Nov 4, 2025	 W09 Preparation (https://q.utoronto.ca/courses/415301/assignments/1566410)	due by 3pm
Mon Nov 10, 2025	 T06 Report (https://q.utoronto.ca/courses/415301/assignments/1566429)	due by 3pm
Tue Nov 11, 2025	 W10 Preparation (https://q.utoronto.ca/courses/415301/assignments/1566411)	due by 3pm
Mon Nov 17, 2025	 T07 Report (https://q.utoronto.ca/courses/415301/assignments/1566430)	due by 3pm
Tue Nov 18, 2025	 W11 Preparation (https://q.utoronto.ca/courses/415301/assignments/1566412)	due by 3pm
Thu Nov 20, 2025	 Assignment 3 (https://q.utoronto.ca/courses/415301/assignments/1565375)	due by 3pm