# CSC165H1S 20251 (All Sections): Mathematical Expression and Reasoning for Computer Science

Jump to Today ✎ Edit

---

↓Contents↓

Before you can access the Ed discussion board (from the navigation menu), you must **sign up for Ed (https://edstem.org/us/join/w5fwuc)**, using your UTOR email address (ending in `@utoronto.ca` or `@mail.utoronto.ca`).

**ATTENTION! You must be enrolled in a section that you can *actually attend in-person*.** There will be multiple term tests written during regular lecture time, and you **must** write with the lecture section you are enrolled in on ACORN (to ensure we have enough seats and test copies in each room). Exceptions can be made only for **unexpected** circumstances outside your control (e.g., illness).

## Feeling Ill? Missed some work?

The **missed test policy** sub-section explains how we handle tests missed for unexpected reasons outside your control.
The **Special Consideration** section explains what you must do to receive *any* form of special consideration.
**Please read these sections carefully, and follow the instructions.**

**Contact your College Registrar (https://future.utoronto.ca/current-students/registrars/) immediately if you miss the exam!**
Course instructors cannot grant Special Consideration for Final Examinations; only your College Registrar can help — the process is explained in more detail on the **Sidney Smith Commons (https://sidneysmithcommons.artsci.utoronto.ca/i-cant-make-a-test-or-exam-what-do-i-do/)**.

## Got a Question or Concern?

See below how to **contact us**. Do **NOT** use Quercus messaging! Do **NOT** send email directly to your instructor or TA!

---

↓Contents↓

## Overview

Use the table below as your starting point for all the materials in the course. In particular, the worksheets and lecture slides will tell you exactly what you need to read and know.

Here is a **one-page term schedule (https://q.utoronto.ca/courses/379703/files/35464201?wrap=1)** ⬇ **(https://q.utoronto.ca/courses/379703/files/35464201/download?download_frd=1)** that gives a visual overview of the entire term.

## Week-by-week overview of course activities

| Dates | Materials / Activities | Assessments |
|---|---|---|
| Jan 06 – Jan 10 | **WS01-Mon (https://q.utoronto.ca/courses/379703/files/35518785?wrap=1)** ⬇ **(https://q.utoronto.ca/courses/379703/files/35518785/download?download_frd=1)** / **WS01-Mon-Sol (https://q.utoronto.ca/courses/379703/files/35518802?wrap=1)** ⬇ **(https://q.utoronto.ca/courses/379703/files/35518802/download?download_frd=1)** ; **WS01-Wed (https://q.utoronto.ca/courses/379703/files/35566874?wrap=1)** ⬇ **(https://q.utoronto.ca/courses/379703/files/35566874/download?download_frd=1)** / **WS01-Wed-Sol (https://q.utoronto.ca/courses/379703/files/35566875?wrap=1)** ⬇ **(https://q.utoronto.ca/courses/379703/files/35566875/download?download_frd=1)** | |
| Jan 13 – Jan 17 (**Jan 17:** *last day to enrol)* | *TBA* | |
| Jan 20 – Jan 24 | *TBA* | |
| Jan 27 – Jan 31 | *TBA* | **Term Test 1** (***12.5%**** / *Jan 27)* |
| Feb 03 – Feb 07 | *TBA* | |
| Feb 10 – Feb 14 | *TBA* | **Term Test 2** (***12.5%**** / *Feb 12)* |
| Feb 17 – Feb 21 | **Reading Week:** No lectures; office hours (if any) will be announced separately. | |
| Feb 24 – Feb 28 | *TBA* | |

| Dates | Materials / Activities | Assessments |
|---|---|---|
| Mar 03 – Mar 07 | *TBA* | |
| Mar 10 – Mar 14 (**Mar 10:** *last day to drop)* | *TBA* | **Term Test 3** *(**12.5%**[*] / Mar 10)* |
| Mar 17 – Mar 21 | *TBA* | |
| Mar 24 – Mar 28 | *TBA* | **Term Test 4** *(**12.5%**[*] / Mar 26)* |
| Mar 31 – Apr 04 | *TBA* | |
| Apr 09 – Apr 30 | (**Final Exam schedule** (https://www.artsci.utoronto.ca/current/faculty-registrar/final-exams) , from Arts & Science) | **Final Exam** **(50%)**[†] |

[*] All Term Tests take place **during your regular lecture time** — test rooms will be added to the **Test & Exam Information table**, and the **Course Summary** below has a detailed list of dates and times. Your *two* lowest test marks will be worth 10% each, your *two* highest test marks will be worth 15% each.
[†] The Final Exam will be scheduled by the Faculty of Arts & Science. **In order to pass the course, you must earn at least 25% on the final exam.** In other words, if your final exam mark is strictly less than 25%, your final mark in the course will be reduced (if necessary) to no more than 45.

Contents

# Table of Contents

This page contains LOTS of information, all in one place (to make it easier to search)! The following links may help you find what you are looking for a little faster, but **we strongly recommend that you read this entire syllabus at least once** (during the first week of term would be ideal), to make yourself familiar with the course organization and expectations.

↑ Contents ↑

# Logistics

- **This is an in-person course**, meaning that you must be available for in-person activities (lectures) and assessments (term tests and final exam).
- All lectures and office hours begin *ten minutes past the hour*.
- You are welcome to attend office hours held by any instructor or TA.
- See the technical advice further below, for additional information about connecting to online office hours.
- TA office hours will NOT follow a regular schedule. The details will be posted here, usually the week before the office hours take place (though it may sometimes be just a day or two before).
- Lectures will typically consist of a mixture of active learning (working on problems), and presentations by instructors and/or TAs, with *at least 50% active learning*. Because the ratio of students to instructors (and TAs) is very high in this course, *you are strongly encouraged to attend all lectures*. Make good use of this opportunity to access our support!
- Recordings will be generated automatically for some (maybe not all) lecture sections, and can be accessed through the OCCS Student App. The OCCS generally works well, but **we cannot guarantee that every lecture will be recorded** (for example, we have encountered technical issues in the past that prevented lectures from being recorded). Even when lecture recordings are available, they will usually contain long silences while the class is working on problems and the instructor and TAs are answering questions. This is normal: recordings will be provided with **no** editing.
- *Remember that course videos and materials belong to your instructor and the University, and are*

*protected by copyright.* You are permitted to download videos and materials for your own personal academic use, but *you may not copy, share, or otherwise distribute them* without explicit permission from the instructor.

↑Contents↑

## TA Office Hours

| Day and Time | TA | Room or Zoom |
|---|---|---|
| *TBA* | *TBA* | *TBA* |

↑Contents↑

## Course Staff & Office Hours (Jan 6 – Apr 4)

| Who? (Role) | Where? | When? |
|---|---|---|
| François Pitt<br>(Instructor)<br>***NO** office hour on Jan 7* | BA 3289 | Tue 13:00–15:00<br>Thu 13:00–15:00 |
| | **Zoom Link (https://utoronto.zoom.us/j/89840227200)**<br>Meeting ID: 898 4022 7200<br>Passcode: 165165 | Fri 09:30–11:30 |
| Gary Baumgartner<br>(Instructor)<br>***NO** office hour on Jan 7* | BA 3289 | Tue 16:30–18:30<br>Thu 16:30–18:30 |
| Amin Gillani<br>(Support Staff) | *N/A* | *N/A* |
| Ziyang Jin<br>(Lead TA) | *N/A* | *N/A* |

↑Contents↑

## Lecture Schedule

(check on ACORN to confirm rooms and times)

| What? (Section) | Who? (Instructor / TAs) | Where? (Room) | When? (Day & Time) |
|---|---|---|---|
| LEC 0101 | François Pitt | PB B250 | Mon 11:00–13:00 |
| | | MP 203 | Wed 11:00–13:00 |
| LEC 0201 | Gary Baumgartner | FE 114 | Mon 13:00–15:00 |
| | | PB B150 | Wed 13:00–15:00 |

| What? (Section) | Who? (Instructor / TAs) | Where? (Room) | When? (Day & Time) |
|---|---|---|---|
| LEC 0301 | François Pitt | AH 400 | Mon 15:00–17:00<br>Wed 15:00–17:00 |
| LEC 5101 | Gary Baumgartner | MP 202 | Mon 18:00–20:00<br>Wed 18:00–20:00 |

↑ Contents ↑

## Contact Us

Please do **NOT** use Quercus messaging! Please do **NOT** send email directly to your instructor or TA!

1. **Before you ask your question**, please *take a few minutes to see if it might already be answered* on this page (or pages linked from it, including Ed). You will get an answer faster (no need to wait), and it will make the course better for everyone by leaving us more time to answer other questions.
2. In particular, all course announcements will be posted here, on Quercus. *You are responsible for reading all announcements made by the course team (instructors / TAs / staff), and for being familiar with the entire content of this Syllabus*.
3. If your question is NOT already answered on the course website or discussion board, then either:
   - Start a new topic on Ed (the course discussion board — see below for more details), for all questions of *general interest* (whose answer could be useful to other students).

   or:
   - Send email **from your U of T email address, to the course email address** (`csc165-2025-01@cs.toronto.edu` **(mailto:csc165-2025-01@cs.toronto.edu)** ), for all questions that are *personal* (whose answer is useful only to you). **Please include your UTORid (username) in the body of your message.**
4. In particular, please ask ALL questions about course content and problems directly on Ed. This also applies to questions about course administration / logistics, *except* for very personal questions that are relevant only to your unique situation, where you should use email.
5. **Do NOT post any message that reveals the questions or answers on one of our Term Tests, until at least TWO FULL DAYS (48 hours) AFTER the test has been written by EVERY student (including the evening section).**
6. We aim to respond to all email and Ed postings within 48 business hours (not counting weekends and holidays). However, it may take longer, especially near due dates or before the start of classes. If you do not hear back after four days, please do not hesitate to send a follow-up email, or come in person during office hours.

↑ Contents ↑

## Ed Discussion

Before you can access the Ed discussion board (from the navigation menu), you must **sign up for Ed (https://edstem.org/us/join/w5fwuc)**, using your UTOR email address (ending in `@utoronto.ca` or `@mail.utoronto.ca`).

Ed Discussion used to be supported directly by U of T, and does **not** share (or harvest) data for any third parties (for full details, see **Ed's Privacy Policy (https://edstem.org/privacy)**). We prefer it to the alternatives because we find that it provides a better UI on desktop and mobile devices, with unique features such as the ability to include "spoilers" in all posts or comments.

If you have any issue or question about signing up for Ed Discussion, please send email to the course address (as described above).

**If you ask a question that has already been answered, it will be made Private and we will ask you to search for the answer**. *We are NOT doing this to be mean or rude*, but to make it possible for us to help as many students as possible. Instead of having instructors (and maybe TAs) spend many hours searching for existing answers, or worse, answering the same questions multiple times, it is much more efficient for each student individually to spend a few minutes looking for the answers. The total amount of work is the same, but distributed among many more students, so each student only has to do a little bit of work. This frees up instructors and TAs to answer new questions, and helps us help everyone better! In many cases, it also allows you to find answers faster (because you don't have to wait).

↑ Contents ↑

# Textbooks & References

**There is NO required textbook for the course.**

- Course-specific reference documents, to be updated continuously throughout the term. Though you may read over these documents at any point, we will provide explicit guidance about *what* you are expected to know (and *when*) from each document. This guidance will be given on each worksheet (see the **Overview (https://q.utoronto.ca/courses/379703#overview)** above), where relevant.
  - **Numeric Types (https://q.utoronto.ca/courses/379703/files/35520735?wrap=1) (https://q.utoronto.ca/courses/379703/files/35520735/download?download_frd=1)** reference
- This course assumes preparation similar to that provided by the **Ontario Grade 12 "Advanced Functions" curriculum (https://www.edu.gov.on.ca/eng/curriculum/secondary/math1112currb.pdf#page=87)** (and its prerequisites). You can find an overview of some of the common notation and results in pages 13–17 of Prof. Liu's historical notes (see below).
- *(OPTIONAL)* Susanna Epp, *Discrete Mathematics with Applications*. Fifth Edition, Cengage Learning, 2020. (Contains many examples and additional practice problems about each topic in the course, and beyond.)
  - **U of T Library Holding (https://librarysearch.library.utoronto.ca/**

permalink/01UTORONTO_INST/14bjeso/alma991107278006806196) for the book.
  - **Discrete Mathematics eBook** (https://www.uoftbookstore.com/adoption-search-results?ccid=5902741&itemid=63247), from the U of T Bookstore. You can also get print copies at the bookstore.
  - **Discrete Mathematics on Cengage.ca** (https://www.cengage.ca/c/discrete-mathematics-with-applications-5e-epp/9781337694193) — use coupon code `CengageW22592` for 10% off when you order directly from Cengage (the code is entered on the shipping and payment details page when you complete your order).
- **Historical Notes by Prof. David Liu** (https://q.utoronto.ca/courses/379703/files/35566868?wrap=1) (https://q.utoronto.ca/courses/379703/files/35566868/download?download_frd=1) *(fixed)*. These provide an overview of each course topic, but without all the details from the reference documents above. They also contain additional examples and practice problems.
- **CSC110H1 Course Notes** (https://www.teach.cs.toronto.edu/~csc110y/fall/notes/), for reference.

↑ Contents ↑

# Marking Scheme and Course Activities

- **Worksheets**, worth no direct credit, completed during lectures.
- **Problem Sets**, worth no direct credit, completed outside lectures.
- Four **Term Tests**, worth 50% in total: 10% for your each of your two lowest test marks, 15% for each of your two highest test marks.
- One **Final Exam**, worth 50%. *You must earn a minimum of 25% on the exam in order to pass the course.*

See the **Overview** table for the exact dates of term work (including the tests).

↑ Contents ↑

## Practice Problems (Worksheets and Problem Sets)

Throughout the term, you will work on practice problems with a range of difficulty levels, both during lectures (Worksheets) and outside lectures (Problem Sets). This will help you practice and deepen your understanding of the course material and its applications. *These problems will **not** be graded for direct course credit*, but we will provide solutions.

Together, the problems on worksheets and problem sets directly embody the course **Learning Outcomes**: you must be able to solve them for yourself to succeed in the course, and in future courses that depend on CSC165H1. So they provide a very concrete way for you to self-assess your understanding.

**However**, keep in mind that this is a problem-solving course. There are many questions that you should learn to *ask yourself* while you are working on problems. While you are learning, it is okay to peek at solutions to gain insights. We will help you learn to find a balance between solving problems fully on your own and making good use of solutions to support your learning.

*Worksheets and Problem Sets will be added directly to the **Overview** table.*

↑ Contents ↑

# Term Tests and Final Exam

Test & Exam Information

*(see the **Overview** for dates, times, and location)*

| Test | Coverage | Practice | Papers & Solutions |
|---|---|---|---|
| TT1 | Lecture hours 1–5 | *TBA* | *TBA* |
| TT2 | Lecture hours 5–9 | *TBA* | *TBA* |
| TT3 | Lecture hours 9–13 | *TBA* | *TBA* |
| TT4 | Lecture hours 13–17 | *TBA* | *TBA* |
| Exam | Comprehensive: you are expected to be familiar with **all** the material covered in the course, including the last few lecture hours (18–20). | **Old Exams Collection (https://myaccess.library.utoronto.ca/login?url=https://exams.library.utoronto.ca)** | Exam Cover Page *TBA* Exam Reference Sheet *TBA* |

↑ Contents ↑

## What to expect (in general terms)

We know tests are time-limited; we won't ask questions that require a lot of time to figure things out! For example, we are not likely to ask you to solve a completely new problem that requires significant creativity, because that might require you to spend too long thinking about various possibilities to find one that works. But we *could* give you a problem *similar* to a challenging practice problem, one where the key insight from the problem can be applied fairly directly. This would then be considered a reasonably easy question, because you wouldn't need to come up with any new ideas to solve it, just show that you can apply something you have already learned (assuming that you did learn it from working on the practice problem, of course).

↑ Contents ↑

## How to prepare

First review the materials listed above, starting with the practice problems. Make sure you understand how to solve each problem, and use this to decide what to review next — focus on the topics and problems that you have more difficulty with. Don't forget to compare your answers against sample solutions (when these are available).

Next, you can try questions from previous years' term tests — see above for some links, but **please read the rest of this paragraph first**! Keep in mind that questions on our test are more likely to be related to problems you have *already* worked on this term than to questions from previous tests. At the same time, these past test problems are a good way to practice your understanding. *For maximum benefit, we strongly suggest the following approach:* try these questions only **after** you have finished reviewing the rest of the materials from this term; **time yourself** to get the benefit of a real "test experience", as a way to verify not only your understanding, but also your ability to answer questions quickly (this will matter for the actual tests); and finally, *don't look at the solutions* until you have finished working on the questions as if it were a real test.

Make good use of the **Sidney Smith Commons' Exam Toolkit (https://sidneysmithcommons.artsci.utoronto.ca/exam-toolkit/)** . This contains many general resources to help you prepare for term tests and the final exams, including sections on "what to expect", "how to study", and "strategies".

↑ Contents ↑

## How to write tests (and the exam)

**Read the questions!** If you answer the wrong question, even if it's because you were nervous and you misread it, there is nothing that we can do. If something is unclear, *please ask*.

**Manage your time!** Be disciplined, to leave most of your time free for solving problems. In particular, it's fine to give point-form answers with the key elements, instead of spending time writing long, complete sentences.

**Be precise!** For this course in particular, it is very important to use the correct terms and notation. Say what you mean carefully and precisely.

**Show what you know!** Your strategy during the test should be:

- to identify the questions that you know how to answer (this means that you must read EVERY question **before** you start answering any of them);
- to answer those questions right away;
- to go back to the questions you're not sure about, and work on them;
- if you get stuck on a question, to move on to the next one and come back later (don't waste your time) — you can figure out ahead of time how much time to devote to each question (based on how much it's worth), and stick to that estimate as much as possible.

If you have an idea how to solve a question but no time to do it in detail, then of course you should write down your idea. You will get part marks for any question where you have the correct structure (i.e., clearly showing that you know what you are supposed to do), even if you cannot fill in the details. So it always pays off to take a minute to write down a correct outline for your answer — it's worth marks, even if you are unable to do more.

**Explain what you're doing!** When you give an answer, make sure that you give at least a short statement of what you're doing before giving us the answer: if your answer is incorrect, this can make the difference between getting NO mark (because we can't tell if you understand what you're doing) or getting part marks (if we see that you have the right idea but simply made a small error, or that you have the wrong idea but wrote it up correctly).

**Don't ramble!** Write concise, to-the-point answers. If you ramble, or if you write an answer for a related (but different) problem with no adjustment or explanation, it gives us concrete evidence that you don't know the correct answer. Also, be aware that if you give us a correct answer followed by explanations that are clearly wrong or irrelevant, you will lose marks! So only write down what you know is correct: if you're not sure, either say so explicitly or don't say anything.

On the other hand, if you start writing down an answer and you realize that it's wrong, SAY SO! You'll get more part marks for showing that you understand your mistake, even if you're not sure how to fix it, than if you simply leave it like that (which demonstrates that you don't even realize that what you did was wrong).

On a related note, don't feel like you must fill all the available space: it is quite possible that a correct answer will require only part of the space for some questions.

**Take care of yourself!** You'll function much better if you are well-rested and relaxed than if you are tired or tense. Take some time to exercise (moderately), to burn off some of your body's stress, leaving you better able to manage your stress levels and better able to perform. Eat a nutritious meal (but not too much) so you're not hungry during the test. And get a good night's sleep the night before.

A related tip we learned from a student: trying to "force yourself to be calm" may not work well, or may even backfire, because you're trying to suppress your body's natural response to stress. Instead, trick your brain into thinking that what you're feeling is not stress — it's excitement! The two feelings are similar enough, you can think of it as looking forward to the challenge — the way a trained athlete is primed for a competition, and turning their nervousness into positive stress.

↑ Contents ↑

## Policy for missed term tests

To help stop the spread of respiratory viruses, including **Influenza (flu)** (https://www.ontario.ca/page/flu-facts) and **COVID-19** (https://www.ontario.ca/page/protection-covid-19-and-other-respiratory-illnesses), **anyone who feels sick should stay home** and complete the **self-assessment** (https://www.ontario.ca/self-assessment/) tool to learn more about what to do next. The number 1 precaution when you are sick is to wear a **well-fitted mask** (https://www.ontario.ca/page/protection-covid-19-and-other-respiratory-illnesses#section-3) in all public settings. [From the U of T Environmental Health & Safety's **Procedures for Respiratory Illnesses** (https://ehs.utoronto.ca/symptomatic-or-confirmed/).]

Keep in mind that **course instructors cannot grant Special Consideration for Final Examinations**! If you

are unable to write the final exam, please contact your **College Registrar (https://future.utoronto.ca/current-students/registrars/)** for the next steps — the process is explained in more detail on the **Sidney Smith Commons (https://sidneysmithcommons.artsci.utoronto.ca/i-cant-make-a-test-or-exam-what-do-i-do/)** .

**You are expected to write *every* test.** In addition to providing us with a component of your final course mark, each test will provide *you* with valuable feedback on your understanding of a significant portion of the course material. If you are truly unable to write a test, we can make up for the missing marks easily enough (as described in the next paragraphs), but it is more difficult (and requires more work on your part) to make up for the lost learning opportunity. This places you at a disadvantage for the rest of the course, including the final exam. The policy described in the next paragraphs does NOT mean that you can choose to simply "skip a test". Rather, it is meant for *emergencies:* situations where you are truly **unable** to write the test with everyone else (not just when it is inconvenient). You have to judge whether your situation is an *inconvenience* that prevents you from performing at the top of your abilities but that is a direct result of some of your choices, or that has a limited impact on your performance, vs a major disadvantage that makes your performance *significantly* worse than normal and that was *NOT a result of your own choices*. We understand that sometimes, it can be difficult to make a clear distinction between these two types of situations. For your own sake, we ask that you be realistic about your expectations and that you only request Special Consideration when it is truly necessary.

*If you miss a test for unexpected reasons outside your control, please follow the instructions in the **Special Consideration** section.* **If you miss one test *for approved reasons***, we will calculate a mark for the test you missed, based on your performance on the other tests *and on the final exam*, taking into account the class averages on every test and exam. We do this by calculating a combined z-score for your exam and other tests, where the exam has the *same weight* as each test (this provides a statistically accurate measure of the "distance" between your performance and the class average), then *assigning* a mark for each missed test that corresponds to the *same* z-score. This approach ensures that you are not unfairly penalized if the test you missed was easier, but also that you do not gain an unfair advantage if you missed a harder test: in every case, your performance relative to the rest of the class remains unchanged, and the mark we calculate for you is relative to the class average for the test(s) you missed. (This calculation is performed *before* we determine the lowest and highest test marks, when generating final course marks.) In this case, we *recommend* that you **make an appointment with our department's Learning Strategist (https://forms.office.com/r/M3QYcP2a46)** to discuss your situation, but *this is **not** required* to receive special consideration for only one missed test.

**If you miss more than one test**, we **require** that you make an appointment with our department's Learning Strategist, to put in place a concrete plan for the rest of the term, *before* we will approve any exception. This ensures that you are realistic about your ability to succeed in the course and that you have thought about how you will manage the risk: after all, missing more than one test puts you in a situation where you would be taking the final exam with NO feedback on your performance on half (or more) of the material in the course. *We will require confirmation from our Learning Strategist* that you have met with them and that your approach to the rest of the term is realistic. This ensures that you make decisions based on concrete plans that are likely to lead to success, not based on need alone, or on "magical thinking" that everything will just work out fine. Once we receive confirmation that you have met with a learning strategist, we can easily put in place appropriate accommodations for all your missed work, using the z-score method described above.

At the limit, **we cannot approve special consideration for *every* test**. In other words, special consideration can be provided for missed tests **only if** you have taken *at least* one test during the term. If you have faced circumstances disruptive enough to make you unable to write *every single test*, then NO special consideration can be provided, for ANY of your missed tests. In this scenario, it is unrealistic to expect that you have been able to learn the course material. If you have been unable to demonstrate your learning for the **entire** term, *please speak with your College Registrar to file a petition to drop the course, and make plans to take it again later.* We understand it can be terribly frustrating to want to engage with the course and be prevented from it by circumstances outside your control. But wishful thinking is not the same as actual learning… it's much better for you to engage with the support services in place within the university, and to work on a *realistic* alternative.

↑ Contents ↑

# Academic Integrity

**All work you submit must be your own.** It is an academic offence to copy the work of someone else — even if the other person is not a student — *unless you explicitly and clearly attribute the work to its original source*. This includes words, sentences, entire documents, and even ideas. Whether you copy or let someone else copy, it is an offence. Academic offences are taken very seriously and can have correspondingly serious consequences.

At the same time, we want you to benefit from working with other students. For this course, you are allowed to discuss how to solve the practice problems with anyone you wish. The purpose of the practice problems is to ensure that **you** understand how to solve them. Even if you did not generate a solution yourself, you can still receive useful feedback on your work. (See the **Practice Problems** section for more details.)

You are also welcome to freely discuss course material and technology (such as LaTeX), and we encourage you to do so. For example, you may work through examples that help you understand course material or a new technology, or help each other configure your system to run a supporting piece of software.

**Any collaboration on, or sharing of, term test solutions *or questions* is strictly forbidden!**

Please take a few minutes to consult the **Academic Integrity at U of T (https://www.academicintegrity.utoronto.ca/)** website: it contains good information and concrete strategies to help support your learning in ways that follow the principles of academic integrity, in addition to references to formal policies and procedures.

## What about ChatGPT?

In this course, you may use generative artificial intelligence (AI) tools (like ChatGPT and GitHub Copilot) as learning aids and to help complete practice problems. *You will NOT be permitted to use generative AI on the term tests 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. They 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 on these tools to complete your coursework. Instead, we recommend treating generative AI as a supplementary tool only for exploration or drafting content — **always remembering to cite any resource you used to generate your answers**. 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 term tests or final exam, in later courses, or in future work or studies after graduation.

↑ Contents ↑

# Special Consideration

To help stop the spread of respiratory viruses, including **Influenza (flu)** (https://www.ontario.ca/page/flu-facts) and **COVID-19** (https://www.ontario.ca/page/protection-covid-19-and-other-respiratory-illnesses), **anyone who feels sick should stay home** and complete the **self-assessment** (https://www.ontario.ca/self-assessment/) tool to learn more about what to do next. The number 1 precaution when you are sick is to wear a **well-fitted mask** (https://www.ontario.ca/page/protection-covid-19-and-other-respiratory-illnesses#section-3) in all public settings. [From the U of T Environmental Health & Safety's **Procedures for Respiratory Illnesses** (https://ehs.utoronto.ca/symptomatic-or-confirmed/).]

If you are unable to complete course work or if you miss a test due to major illness or other circumstances outside of your control, **please get in touch with us *immediately* (don't wait) — *even if you do NOT have documentation***. Special consideration will be evaluated on a case-by-case basis and is not given automatically — we may be unable to grant you exactly the special consideration you seek, so please ensure we have time to discuss your situation.

In order to receive special consideration, you must fill out a **Request for Special Consideration Form** (https://forms.office.com/r/sEdNY2LxJn). Simply complete and submit the form online as soon as you can, **together with supporting documentation**. Accepted forms of documentation include Absence Declaration (via ACORN), or the University's Verification of Student Illness or Injury (VOI) form, or letters from your College Registrar or Accessibility Services. Remember that *Absence Declaration can be used at most ONCE PER TERM*, and for a maximum of seven consecutive days. If you have already used your Absence Declaration for the term, **you must submit other acceptable documentation**. For more information on each type of documentation, including when and how to use it, please read all the details carefully on the **Student Absences** (https://www.artsci.utoronto.ca/absence) page from the Faculty of Arts & Science.

**IMPORTANT:** If you know that you will NOT be able to write a term test, just submit the request form as soon as you are able (and have obtained appropriate documentation). It is NOT necessary to send email for "simple" requests due to illness / injury or personal / family emergencies — just the form is sufficient. However, if your situation is particularly unusual or complex (for example, if you are unable to obtain appropriate documentation), please contact us by email at csc165-2025-01@cs.toronto.edu (mailto:csc165-2025-01@cs.toronto.edu) to discuss the details. In that case, **please reach out as soon as you can** (even before you have obtained documentation): it is always easier to resolve situations earlier rather than later.

If you face a situation that is particularly disruptive (especially if it is likely to affect more than one course), please also contact your **College Registrar (https://future.utoronto.ca/current-students/registrars/)** — they are best equipped to provide you with general advice and support that goes beyond a single course. They can also help you document your situation and contact each of your course instructors on your behalf, to simplify the process of requesting accommodations.

↑ Contents ↑

# Remark Requests

If you believe there was an error in the marking of your work — or if you just have questions about how your work was marked — you may request that it be remarked. Please complete and submit a Remark Request **directly on MarkUs** (no separate form or email message is required). You must give a specific reason for the request, referring to possible errors or omissions by the marker, or asking specific questions about the feedback (or lack of feedback) you received.

Remark requests must be received within **two weeks** of when the item was returned.

Please note that when we receive a remark request, we may remark the entire submission, though we will generally focus on the questions that are the subject of your request. Your mark may go up or down as a result of the remark. *This is not meant to discourage you from submitting remarking requests!* Just to acknowledge the reality that errors can be made in both directions in the initial marking: it's possible that TAs misunderstand your solution and penalize it more than appropriate, but it's also possible that TAs forget or miss some mistakes in your solution and do not apply appropriate penalties. When we remark, we correct both types of marking errors.

↑ Contents ↑

# Creating a Positive Learning Environment

We are committed to creating a respectful learning environment in computer science courses for all students and expect that you will adhere to the University of Toronto's **Code of Student Conduct (https://governingcouncil.utoronto.ca/secretariat/policies/code-student-conduct-december-13-2019)**. Please be mindful of how your behaviour influences the atmosphere in our learning community, not just in classes, but

also in computer labs, in online forums, and anywhere that you interact with other students and members of the department.

## About Masks

*If you feel sick* (even if you have not tested positive for COVID-19), we kindly ask that you wear a mask during lectures and in-person office hours, as a courtesy to all your classmates (some of whom may live with immunocompromised individuals). Wearing a mask is a simple, non-invasive way to be considerate to your community by reducing the risks of transmission of COVID-19 (and other airborne illnesses), especially in indoor spaces where distancing is not possible.

↑ Contents ↑

# Accessibility

The University of Toronto is committed to accessibility. If you require accommodations for an ongoing disability or an acute issue such as an injury, you should register with **Accessibility Services (https://studentlife.utoronto.ca/service/accessibility-services-registration-and-documentation-requirements/)** (AS). The process of accommodation is both confidential and private. AS provides the information necessary to implement an accommodation and no more, e.g., what is listed in a Letter of Accommodation. Your instructors and other university staff will not reveal that you are registered with AS.

Students who require accommodations for term tests (or the final exam) must register with **Accommodated Testing Services (https://lsm.utoronto.ca/ats/)** (ATS). We will only be providing test accommodations sent to us through that official channel. This helps to guarantee that accommodations are provided in a fair and consistent manner for everyone.

↑ Contents ↑

# Course Description

Introduction to abstraction and rigour. Informal introduction to logical notation and reasoning. Understanding, using and developing precise expressions of mathematical ideas, including definitions and theorems. Structuring proofs to improve presentation and comprehension. General problem-solving techniques. Representation of floating-point numbers. Running time analysis of iterative programs. Formal definition of Big-O. Diagonalization, the Halting Problem, and some reductions. Unified approaches to programming and theoretical problems.

*Corequisites:* CSC108H1 / CSC120H1 / (equivalent programming experience). *(If you have not enrolled in or completed CSC108 / CSC120, that's okay — you will still be allowed to take CSC165. However, in this case it is your responsibility to ensure that you have the equivalent programming experience so that you're prepared to succeed in this course.)*

*Exclusions:* CSC111H1, CSC236H1, CSC240H1, MAT102H5, CSC236H5, CSCA67H3, MATA67H3,

CSCB36H3

↑ Contents ↑

## Learning Outcomes

By the end of this course, you will be able to …

- Express statements and problems using precise mathematical language.
- Evaluate the correctness and style of mathematical proofs.
- Create a mathematical proof or disproof of a given statement, choosing from among different proof techniques.
- Compare functions asymptotically.
- Determine, and prove, asymptotic bounds on the time complexity of algorithms.

↑ Contents ↑

# Technical Requirements

Some course activities (office hours) may be offered online, through Zoom.

- To join online office hours, you must be signed in to your U of T Zoom account.
- "*What U of T Zoom account?*" Glad you asked: log into the **U of T Zoom portal (https://utoronto.zoom.us/)** to claim your *free* Zoom education license.
- You will have a much better experience if you use the most recent version of the desktop client for Zoom, instead of accessing it through a web browser.
- More generally, to fully participate in all course activities, you require reliable access to a **full computer** (*not just a smartphone*) on which you can browse web pages, read lecture slides, and (potentially) type and submit practice problems.
- To attend online office hours, this computer must have a **microphone**, optionally a webcam, as well as a **reliable, high-speed internet connection**.

↑ Contents ↑

# LaTeX help

LaTeX is a standard typesetting program used in computer science, and we encourage you to learn how to use LaTeX as part of your work — *though this is **not necessary** to submit work in this course*. In this section, we provide some resources to help you get started with LaTeX.

There is no general "course template" for LaTeX documents. Time permitting, we may try to post samples here if people run into difficulties generating certain types of content (e.g., graph pictures). Also, you can always ask questions on Ed, where we will be happy to help.

Otherwise, you may find the following links helpful.

- **Overleaf** (https://www.overleaf.com/) is an online application that allows you to edit and compile LaTeX files right in your browser, and even collaborate with others — *always while following Academic Integrity requirements, of course*. It also provides some **tutorials** (https://www.overleaf.com/learn) on the basics of using LaTeX.
- A detailed, yet simple and accessible online LaTeX tutorial **(a great place to start):** https://www.latex-tutorial.com/ (https://www.latex-tutorial.com/).
- Download LaTeX on the official LaTeX webpage: https://latex-project.org/ (https://latex-project.org/) (click on “Get” in the top menubar and select an appropriate distribution to download).
- A relatively comprehensive introduction to LaTeX **(highly recommended, but long):** https://ctan.mirror.rafal.ca/info/lshort/english/lshort.pdf (https://ctan.mirror.rafal.ca/info/lshort/english/lshort.pdf).
- A LaTeX wiki (most Google searches lead here): https://en.wikibooks.org/wiki/LaTeX (https://en.wikibooks.org/wiki/LaTeX).
- A fantastic application of machine learning; use it to find LaTeX commands based on the symbol: https://detexify.kirelabs.org (https://detexify.kirelabs.org).
- A graphical LaTeX editor (requires downloading and installing the software): https://www.lyx.org/ (https://www.lyx.org/).
- A different graphical editor (also requires downloading and installing software): https://texmacs.org/ (https://texmacs.org/)
- A forum for asking LaTeX-related questions **(highly recommended)**: https://tex.stackexchange.com/ (https://tex.stackexchange.com/).

↑ Contents ↑

# Course Summary:

| Date | Details | Due |
|---|---|---|
| Mon Jan 27, 2025 | Term Test 1 (LEC0101) (https://q.utoronto.ca/calendar?event_id=949711&include_contexts=course_379703) | 11:15am to 12:45pm |
| | Term Test 1 (LEC0201) (https://q.utoronto.ca/calendar?event_id=949712&include_contexts=course_379703) | 1:15pm to 2:45pm |
| | Term Test 1 (LEC0301) (https://q.utoronto.ca/calendar?event_id=949713&include_contexts=course_379703) | 3:15pm to 4:45pm |
| | Term Test 1 (LEC5101) (https://q.utoronto.ca/calendar?event_id=949714&include_contexts=course_379703) | 6:15pm to 7:45pm |

| Date | Details | Due |
|---|---|---|
| Wed Feb 12, 2025 | Term Test 2 (LEC0101) (https://q.utoronto.ca/calendar?event_id=949715&include_contexts=course_379703) | 11:15am to 12:45pm |
| | Term Test 2 (LEC0201) (https://q.utoronto.ca/calendar?event_id=949716&include_contexts=course_379703) | 1:15pm to 2:45pm |
| | Term Test 2 (LEC0301) (https://q.utoronto.ca/calendar?event_id=949717&include_contexts=course_379703) | 3:15pm to 4:45pm |
| | Term Test 2 (LEC5101) (https://q.utoronto.ca/calendar?event_id=949718&include_contexts=course_379703) | 6:15pm to 7:45pm |
| Mon Mar 10, 2025 | Term Test 3 (LEC0101) (https://q.utoronto.ca/calendar?event_id=949719&include_contexts=course_379703) | 11:15am to 12:45pm |
| | Term Test 3 (LEC0201) (https://q.utoronto.ca/calendar?event_id=949720&include_contexts=course_379703) | 1:15pm to 2:45pm |
| | Term Test 3 (LEC0301) (https://q.utoronto.ca/calendar?event_id=949721&include_contexts=course_379703) | 3:15pm to 4:45pm |
| | Term Test 3 (LEC5101) (https://q.utoronto.ca/calendar?event_id=949722&include_contexts=course_379703) | 6:15pm to 7:45pm |
| Wed Mar 26, 2025 | Term Test 4 (LEC0101) (https://q.utoronto.ca/calendar?event_id=949723&include_contexts=course_379703) | 11:15am to 12:45pm |
| | Term Test 4 (LEC0201) (https://q.utoronto.ca/calendar?event_id=949724&include_contexts=course_379703) | 1:15pm to 2:45pm |
| | Term Test 4 (LEC0301) (https://q.utoronto.ca/calendar?event_id=949725&include_contexts=course_379703) | 3:15pm to 4:45pm |

| Date | Details | Due |
| --- | --- | --- |
| | Term Test 4 (LEC5101) (https://q.utoronto.ca/calendar?event_id=949726&include_contexts=course_379703) | 6:15pm to 7:45pm |