COMP 1805ABC (Winter 2025)
Discrete Structures I

Land acknowledgment

We, the people of the Faculty of Science at Carleton University, acknowledge that our campus is located on the traditional, unceded territories of the Algonquin Anishinabeg people. Miigwetch for your hospitality and stewardship of this territory and the teachings that come from it. We are grateful for this land, the air that we breathe, and the water that sustains us all as well as for the animals, plants and other living beings: these enable us to research, teach, mentor, support, study, and learn. We recognize our responsibility to our natural environment and to reconciliation with Indigenous peoples.

Instructor	**Alina Shaikhet** (she/her/hers)	
Contact	alinashaikhet@cunet.carleton.ca	
Office	HP 5137 (Herzberg Building)	
Best Ways to be in Touch	in class, via email or Discord, or during student hours	
Lab/TA Co-ordinator	**Leila Chinai** Leila.Chinaei@carleton.ca	
Teaching Assistants	A list of teaching assistants and their contact/student hours information will be posted once the course starts.	
Lectures	Section **A** (in-person): Wednesdays & Fridays, 11:35 – 12:55 Section **B** (in-person): Tuesdays & Thursdays, 11:35 – 12:55 Section **C** (online asynchronous): lecture recordings	Check on Carleton Central for the room location.
Tutorials	(in-person); Check your schedule on Carleton Central. Tutorials start January 13th	
Course Website	https://brightspace.carleton.ca/	
Course Forum	Discord server (link is available on the course website)	

Important dates and deadlines can be found here: https://carleton.ca/registrar/registration/dates/academic-dates/, including class suspension for fall, winter breaks, and statutory holidays.

Course Calendar Description

Introduction to discrete mathematics and discrete structures. Topics include: propositional logic, predicate calculus, set theory, complexity of algorithms, mathematical reasoning and proof

techniques, recurrences, induction, finite automata and graph theory. Material is illustrated through examples from computing.

Includes: Experiential Learning Activity
Precludes: additional credit for MATH 1800.
Prerequisite(s): one Grade 12 university preparation mathematics course.
Lectures three hours a week, tutorial one hour a week.

You MUST earn a **C–** or better in this course to take COMP 2804, COMP 3005, COMP 3007, or COMP 4001!

Learning Material(s) and Other Course/Lab-Related Resources

Students are not required to purchase textbooks or other learning materials for this course.

A comprehensive set of course notes, slides, and practice problems with solutions is available on Brightspace. Additionally, recordings of the live in-person lectures will be posted throughout the course for your convenience.

While there is no mandatory textbook, I recommend exploring the interactive textbook from zyBooks. Subscription details can be found on the course website. An approximate cost of the subscription is 90CAD.

Topics Covered and Learning Outcomes

I am committed to fostering an inclusive and respectful learning environment for everyone. In our class, all students, the instructor, and any guests deserve to be treated with respect in every interaction. My goal is to create a space that values and supports the diversity of experiences, thoughts, and perspectives. I will continue to work toward building an inclusive atmosphere and would greatly appreciate your support and feedback in achieving this goal.

Topics Covered

Below is a summary of topics to be covered:

- Propositional & Predicate Logic
- Validity of Logical Arguments (including Quantifiers)
- Proof Techniques (including Induction)
- Set Theory
- Functions; Countability
- Sequences & Sums
- Intro to Algorithms (performance issues); Big O/Ω/Θ Notation
- Recursive Definitions & Recursion
- Graphs
- Relations

A detailed breakdown of topics together with a tentative calendar by section:

COMP 1805 AC – Winter 2025 – Tentative Calendar

	SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
week 1 No Tutorials	5	6	7	Introduction to Discrete Math 8	9	Propositional Logic 10	11
week 2 Tutorial 1	12	13	14	Propositional Logic 15	16	Predicate Logic 17	18
week 3 Tutorial 2	19	T1 quiz due by 23:59 20	21	Predicate Logic 22	23	Validity of Logical Argument 24	25
week 4 No Tutorials Test 1	26	Assignment 1 & T2 quiz due by 23:59 27	28	Validity & Quantifiers 29	30	Proof Techniques 31	Test 1 sometime this week, scheduled by Carleton 1
week 5 Tutorial 3	2	3	4	Proof Techniques 5	6	Set Theory 7	8
week 6 No Tutorials Test 2	9	Assignment 2 & T3 quiz due by 23:59 10	11	Set Theory 12	13	Functions 14	Test 2 sometime this week, scheduled by Carleton 15
week 7 No Tutorials	16	Winter break – no classes 17	18	19	20	21	22
week 8 Tutorial 4	23	24	25	Functions & Countability 26	27	Sequences & Sums 28	1
week 9 No Tutorials Test 3	2	Assignment 3 & T4 quiz due by 23:59 3	4	Intro to Algorithms, Sorting & Searching 5	6	Grows of functions Big $O/\Omega/\Theta$ Notation 7	Test 3 sometime this week, scheduled by Carleton 8
week 10 Tutorial 5	9	10	11	More Asymptotic Analysis Intro Graphs 12	13	Graph Coloring & Exploration (BFS, DFS) 14	15
week 11 Tutorial 6	16	T5 quiz due by 23:59 17	18	Graph Storage & Planarity 19	Assignment 4 due by 23:59 20	Induction 21	22
week 12 No Tutorials Test 4	23	T6 quiz due by 23:59 24	25	Recursion 26	27	Intro to Binary Relations 28	Test 4 sometime this week, scheduled by Carleton 29
week 13 Tutorial 7	30	31	1	Relations, Topological Sort 2	3	**Review & Exam Preparation** 4	5
week 14 No tutorials	6	Assignment 5 & T7 quiz due by 23:59 7	8	9	10	11	12

COMP 1805 B – Winter 2025 – Tentative Calendar

	SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
week 1 No Tutorials	5	6	Introduction to Discrete Math 7	8	Propositional Logic 9	10	11
week 2 Tutorial 1	12	13	Propositional Logic 14	15	Predicate Logic 16	17	18
week 3 Tutorial 2	19	T1 quiz due by 23:59 20	Predicate Logic 21	22	Validity of Logical Argument 23	24	25
week 4 No Tutorials Test 1	26	Assignment 1 & T2 quiz due by 23:59 27	Validity & Quantifiers 28	29	Proof Techniques 30	31	Test 1 sometime this week, scheduled by Carleton 1
week 5 Tutorial 3	2	3	Proof Techniques 4	5	Set Theory 6	7	8
week 6 No Tutorials Test 2	9	Assignment 2 & T3 quiz due by 23:59 10	Set Theory 11	12	Functions 13	14	Test 2 sometime this week, scheduled by Carleton 15
week 7 No Tutorials	16	Winter break – no classes 17	18	19	20	21	22
week 8 Tutorial 4	23	24	Functions & Countability 25	26	Sequences & Sums 27	28	1
week 9 No Tutorials Test 3	2	Assignment 3 & T4 quiz due by 23:59 3	Intro to Algorithms, Sorting & Searching 4	5	Grows of functions Big $O/\Omega/\Theta$ Notation 6	7	Test 3 sometime this week, scheduled by Carleton 8
week 10 Tutorial 5	9	10	More Asymptotic Analysis Intro Graphs 11	12	Graph Coloring & Exploration (BFS, DFS) 13	14	15
week 11 Tutorial 6	16	T5 quiz due by 23:59 17	Graph Storage & Planarity 18	19	Assignment 4 due by 23:59 Induction 20	21	22
week 12 No Tutorials Test 4	23	T6 quiz due by 23:59 24	Recursion 25	26	Intro to Binary Relations 27	28	Test 4 sometime this week, scheduled by Carleton 29
week 13 Tutorial 7	30	31	Relations, Topological Sort 1	2	Review & Exam Preparation 3	4	5
week 14 No tutorials	6	Assignment 5 & T7 quiz due by 23:59 7	TBD 8	9	10	11	12

Learning outcomes

By the end of this course, successful students will have demonstrated their ability to:

- Use mathematically correct terminology and notation to define and reason about fundamental mathematical concepts such as sets, relations, functions, and integers.
- Evaluate mathematical arguments and identify fallacious reasoning.
- Construct mathematical proofs using different techniques.
- Use and analyze recursive definitions.
- Perform asymptotic analysis to describe the running time of different algorithms.
- Demonstrate various traversal methods for graphs.
- Apply critical thinking and logical and analytical reasoning to formulate and evaluate possible solutions to a variety of problems.

Assessment Scheme

Your performance in this course will be assessed using several components, such as assignments, quizzes, tests, and exam. The grades you achieve on these components will be weighted using the following scheme:

COMPONENT	DETAILS	WEIGHT	DUE DATEs
Assignments	best 4 of 5 at 8% each	32%	Jan 27, Feb 10, Mar 3, Mar 20, Apr 7
Tutorial Quizzes	7 quizzes at 2% each. Two attempts per quiz with the best score recorded	14%	Jan 20, Jan 27, Feb 10, Mar 3, Mar 17, Mar 24, Apr 7
Tests	4 (1-hour) tests at 6% each	24%	scheduled by the University during weeks 4, 6, 9, and 12.
Final Exam	no double-pass rule	30%	scheduled by the University during exam period

There is an opportunity to receive up to **5%** of **Bonus Points** that will be added to your final grade. Details are on the course website. Bonus points are optional, - not doing bonus points will not negatively impact your final grade.

Assignments

There are **5 assignments**. The best 4 are worth 32% of your final grade. The lowest assignment grade (out of 5) will be dropped. Please “save” your dropped assignment for unforeseen emergencies. **You cannot drop more than one assignment.** Late assignments will be accepted for up to 12 hours after the deadline without penalty. The solutions will be posted shortly after the “late” deadline. No late assignments will be accepted after that. For each assignment, you will be submitting exactly one PDF file typed/coded using Microsoft Office, Google Docs, or LaTeX. Handwritten submissions (including those that have been scanned or photographed) are not acceptable and will receive a mark of zero. Compressed files (e.g., ”zip”, ”rar”, ”tar”, etc.) or documents in another format (e.g., ”doc”, ”docx”, ”rtf”, ”txt”, etc.) will be penalized and may receive a mark of zero. Assignments will be submitted to Gradescope (access your account through Brightspace). Do not email your assignments to the instructor or TAs.

Tutorials

Tutorials are short lessons where you can practice solving new problems under our guidance. Attending live tutorials is not mandatory but is highly encouraged. Tutorials give you practice solving questions similar to what you will have in your assignments, tests, and final exam. In addition, attending tutorials provides a way to connect with the TAs and classmates. Tutorials are followed by an online activity (aka Tutorial quizzes). There will be **7 tutorials**, each followed by a Tutorial quiz. **Tutorial quizzes are mandatory** and should be submitted by a specified deadline. Each tutorial quiz is worth 2% of your final mark (14% total). Tutorial quizzes are **not timed** and will be open for several days. No lowest-grade tutorial will be dropped, but you will be given **two attempts** on each quiz (with your **best score being recorded**). **Tutorials start Monday, January 13th.**

Tests

There will be **4 tests** worth 24% of your final mark. Tests will be delivered **online** via Brightspace **outside of regular class time**. You will be given a small range of time to start and, once started, a limited time to finish. **The tests will be scheduled by the University.** Please be aware that **they can fall on Friday evening, Saturday, Sunday, or at 7:00AM on a weekday**. If you are planning to travel, please check the schedule first. Travel plans are not an excuse to miss a test. Tests are mandatory and open-book. Open-book refers to class materials only (including slides, notes, textbooks, and approved websites). Any websites or material not approved are strictly forbidden. **There will be no tutorials during the week a test is offered.**

Final Exam

The **final exam** will be **in-person** and scheduled by the University during the exam period. The final exam is cumulative and closed-book. It is mandatory, but there is no double-pass rule.

Late and Missed Work Policies

Late Work

Late tutorial quizzes, late tests, and late assignments (assignments that are more than 12-hours late) are never accepted for any reason. All the submissions are handled electronically, and there is no "grace period" with respect to a deadline. **Technical problems do not exempt you from this requirement**, so if you wait until the last minute and then have issues with your connection, you will still receive a mark of zero. Consequently, when you work on your assignments, you are advised to:

- start early,
- periodically submit your progress (assignments consist of several parts, and you can receive partial marks even if some of the parts are incomplete),
- attempt to submit your final submission at least one hour in advance of the due date and time.

Late assignments will be accepted up to a 12-hour "cut-off" deadline without penalty. Beyond this "cut-off," no further extensions or grace periods will be granted. Assignments not submitted before the "cut-off" will receive a mark of zero. However, to support flexibility, your final grade for the assignment component will be calculated using the best 4 out of the 5 assignment grades received.

Missed Work

Students with an **illness during the span of time a test or tutorial** is offered might be granted an exemption. You need to **contact your instructor right away** and fill out and submit the academic considerations form.

If your request is approved, the weight of the missed test or tutorial will then be applied to the weight of the final exam. **Please note that a student cannot, for any reason, be exempted from more than one (1) tutorial or more than one (1) of the tests**.

Assignments are posted well in advance of their due dates. **Illness does not excuse a student from completing an assignment**. No provision is made for missed assignments, and no extra credit assignments will be available. However, **a student may miss up to 1 assignment** for medical, compassionate, or other reasons without penalty; you do not need to notify your instructor. If you miss more than that, a mark of zero will be used for the missed items when the final grade is computed.

Please note that being "sick" close to the due date is not considered a valid reason for failing to submit your work. Each assignment is available for at least 13 days, so careful planning is essential. If you delay starting your assignment until the last moment and then fall ill, you risk receiving a zero. To avoid this, start early and, if necessary, submit partially completed work as a precaution against unforeseen circumstances. Remember, **illness does not automatically grant permission to miss an assignment**, so organizing your time wisely is important.

Assessment Policies

If any of the files you submit cannot be opened, you will receive a mark of zero. It is your responsibility to ensure we can read your solutions before the deadline. Consequently, after you upload your submission to Gradescope, you must immediately ensure that your submission is the correct type of file, has the correct filename and extension, and can be opened (for marking purposes).

Ensure that each question is correctly assigned to its corresponding page in your pdf when submitting your assignment to Gradescope. Failure to assign questions to pages, or assigning them incorrectly, may result in a penalty.

You are expected to show all your work (i.e., include every step) on everything you submit for marks in this course; a solution that is technically correct will still receive a mark of zero if it is not accompanied by the work required to reach it.

If you wish to appeal a mark (assignment, quiz, or test) you must **make the appeal within 7 days** of the mark being posted on Brightspace. After that, we will not be obliged to accept appeals or change marks. **All complaints regarding assignment marks should be brought to the attention of the TA who marked them.** Only if the TA does not address the problem to your satisfaction should you bring the matter to the instructor.

Lab/TA Coordinator

We have a lab/TA coordinator assigned to this course offering. The lab coordinator is responsible for organizing and overseeing the course's tutorial sections and imposing submission rules to help ensure that marking goes smoothly. If you notice any mistakes within a tutorial, have issues with a tutorial teaching assistant, or have other tutorial-related questions, the lab coordinator should be your first point of contact. The lab coordinator is also responsible for distributing assignments to teaching assistants for marking. If you are missing an assignment grade or are unsure about the status of your assignment, you can contact the lab coordinator.

Course Copyright

All materials created for this course (i.e., video recordings, course notes, coding examples, PowerPoint slides, assignments, tutorials, quizzes, tests, and exams) remain the intellectual property of the instructor and are **protected by copyright**. They are intended for the personal and non-transferable use of students registered in the course. Reproducing, reposting, and/or redistributing any course materials, in part or in whole, without the written consent of the instructor is a copyright violation and is strictly prohibited. Many students are eager to post their work on GitHub, but you must be careful **not** to include copyrighted material.

Academic Integrity

All coursework submitted for marks in this course (assignments, quizzes, exams, etc.) must be completed **individually** and be the result of your own work. Collaboration on any graded coursework is strictly prohibited and will be reported as an academic integrity violation. Copying or modifying solutions from others or online sources is not allowed. Similarly, providing access to your work, rough drafts, or source code to others or enabling plagiarism in any way constitutes a serious offence. If you suspect that someone has gained access to your work without permission, you are required to inform the instructor immediately. Be aware that **electronic tools may be used to analyze and compare submissions** to detect potential academic misconduct.

If you are unsure of the expectations regarding academic Integrity (how to use and cite references, if unauthorized collaboration with lab- or classmates is permitted (and, if so, to what degree), then you must **ASK** your instructor. Sharing assignment or quiz specifications or posting them online (to sites like Chegg, CourseHero, OneClass, etc. or even GitHub) is **ALWAYS** considered academic misconduct. You are **NEVER** permitted to post, share, or upload course materials and your coursework without explicit permission from your instructor. Academic integrity offences are reported to the office of the Dean of Science. Information, process and penalties for such offences can be found on the ODS webpage: https://science.carleton.ca/students/academic-integrity/.

Examples of academic integrity offences include giving/emailing your solutions (even if incomplete) to other students; posting course materials or solutions to a website (including GitHub) at any time (even after the conclusion of the course); copying solutions from any sources, even cited ones; working with other students; getting help from anyone other than the course TAs or

the instructor; submitting solutions (even if incomplete), written by anyone other than the student submitting the work.

Chat GPT/Generative AI Usage

Many of the assessed activities in this course were designed to be completed by an individual working alone. Unless it is explicitly stated otherwise, the **use of any AI system will be considered academic misconduct**. This includes, but is not limited to, chatbots or code generators (e.g., ChatGPT, Google Gemini, Microsoft Copilot), research assistants (e.g., Elicit), and image generators (e.g., Stable Diffusion, Dall-E), etc.

An exception to the above rule is made for automated grammar and punctuation checking tools (such as Grammarly).

School of Computer Science Laptop Requirement

Every student that has been enrolled in a 1000-level (i.e., first year) course offered by the School of Computer Science after the 2020/2021 school year is required to have a laptop. This includes COMP1001, COMP1005, and COMP1006. For more information, please visit https://carleton.ca/scs/scs-laptop-requirement/ and then review the requirements at https://carleton.ca/scs/scs-laptop-requirement/laptop-specs/.

Undergraduate Academic Advisors

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

SCS Computer Laboratory

Students taking a COMP course can access the SCS computer labs. The lab schedule and location can be found at: https://carleton.ca/scs/tech-support/computer-laboratories/. All SCS computer lab and technical support information can be found at: https://carleton.ca/scs/tech-support/. Technical support staff may be contacted in-person or virtually, see this page for details: https://carleton.ca/scs/tech-support/contact-it-support/.

Mental Health and Wellness

Discover the tools and resources Carleton offers to help understand, manage and improve your mental health and wellness while at university: the Carleton Wellness Website.

Academic Accommodations and Regulations

Academic Accommodation

Carleton is committed to providing academic accessibility for all individuals. You may need special arrangements to meet your academic obligations during the term. The accommodation request processes are outlined on the Academic Accommodations website (https://students.carleton.ca/course-outline/).

Chat GPT/Generative AI Usage

As our understanding of the uses of AI and its relationship to student work and academic Integrity continue to evolve, students are required to discuss their use of AI in any circumstance not described here with the course instructor to ensure it supports the learning goals for the course.

Academic Integrity

Students are expected to uphold the values of academic Integrity, which include fairness, honesty, trust, and responsibility. Examples of actions that compromise these values include but are not limited to plagiarism, accessing unauthorized sites for assignments or tests, unauthorized collaboration on assignments or exams, and using artificial intelligence tools such as ChatGPT when your assessment instructions say it is not permitted.

Misconduct in scholarly activity will not be tolerated and will result in consequences as outlined in Carleton University's Academic Integrity Policy. A list of standard sanctions in the Faculty of Science can be found here.

Additional details about this process can be found on the Faculty of Science Academic Integrity website.

Students are expected to familiarize themselves with and abide by Carleton University's Academic Integrity Policy.

Student Rights & Responsibilities

Students are expected to act responsibly and engage respectfully with other students and members of the Carleton and the broader community. See the 7 Rights and Responsibilities Policy for details regarding the expectations of non-academic behaviour of students. Those who participate with another student in the commission of an infraction of this Policy will also be held liable for their actions.

Student Concerns

If you have any concerns regarding this course, your first point of contact is me. Please email me or visit during my student hours, and I will do my best to address your concerns. If I cannot resolve the issue, the next point of contact is the School of Computer Science at studentconcerns@scs.carleton.ca. If the concern remains unresolved, the final point of contact is the Office of the Dean of Science at ODScience@carleton.ca. Please follow this order of contact.

Note: You can also bring your concerns to Ombuds services