Course Outline – last updated December 31st, 2023

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. Precludes additional credit for MATH 1800.
Prerequisite(s): one Grade 12 university preparation mathematics course. Minimum grade of **C-** in COMP 1805 is required in order to take COMP 2804, COMP 3005, COMP 3007, or COMP 4001.

Course Information

Instructor	**Alina Shaikhet** (she/her)
Contact	alinashaikhet@cunet.carleton.ca
Office	HP 5137
Lectures	Section **A** (in-person): Tuesdays & Thursdays, 10:05 – 11:25 Check on Carleton Central Section **B** (in-person): Tuesdays & Thursdays, 16:05 – 17:25 for the room location. Section **C** (online asynchronous): lecture recordings
Tutorials	(in-person); Check your schedule on Carleton Central. Tutorials start January 15th
Lab/TA Co-ordinator	**Leila Chinai** Leila.Chinaei@carleton.ca
Course Website	https://brightspace.carleton.ca/
Course Forum	Discord server (link is available on the course website)

Course Delivery

- This course seamlessly integrates both in-person and online asynchronous sections. Students from either section are welcome to attend in-person classes and access recorded lectures at their own pace. In-person classes have proved to be the most efficient method of learning the material. Meanwhile, recorded lectures give you the flexibility to structure your academic commitments around other obligations, enabling a vital balance between family, work, and educational pursuits.
- **Important note**: While almost all of this course may be taken asynchronously, you must be available in-person on campus for our final exam scheduled by the University.
- Students of the A, B, and C sections will share the same course website hosted on Brightspace. Students are required to be familiar with everything posted there. It is recommended to check our course website at least three times a week.
- The instructors and TAs will be available during scheduled hours for in-person and online office hours to answer questions about course content and assignments. A list of teaching assistants and their contact/office hours information, together with room locations, will be posted once the course starts.
- We will use Discord as our course forum. The forum is non-anonymous - students will be required to use an alias that includes their first and last name, as listed on Brightspace.
- Attendance is optional for the lectures and tutorials. Note that class times will be opportunities to ask the instructor and the TAs questions and get real-time feedback.

Required Textbook and Other Resources

Discrete Mathematics Study Center is a free resource designed specifically for our course. It includes course notes, video lectures, numerous exercises with solutions, and a mock exam.

We do not have an assigned textbook for the course. I recommend you use an interactive textbook from **zyBooks**. Subscription details can be found on the course website.

Necessary Equipment and Software

Assignments for this course should be submitted as a PDF document that was typed or coded using software of your choice. The most popular choices, such as Microsoft Office, Google Docs, or LaTeX are all capable of typesetting mathematical symbols and producing a pdf document. Handwritten submissions (including those that have been scanned or photographed) are not acceptable and will receive a mark of zero.

SCS Laptop Requirement: Every student who 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/.

Topics Covered

Below is a summary of topics the course will cover:
- 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 $O/\Omega/\Theta$ Notation
- Recursive Definitions & Recursion
- Graphs
- Relations

A detailed breakdown of topics together with a tentative calendar is available on the course website.

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:
- 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** 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 15th.**

- 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.**

- 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.

The grades you achieve on these components will be weighted using the following scheme:

5 Assignments (4 best are counted – 8% each assignment)	**32%**
7 Tutorial Quizzes (2% each, 2 attempts with the best score recorded)	**14%**
4 Tests (6% each)	**24%**
Final Exam	**30%**

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.

Important Dates and Deadlines in EST (Ottawa time)

TUTORIAL QUIZ 1	Monday	January 22	by 23:59
ASSIGNMENT 1, TUTORIAL QUIZ 2	Monday	January 29	by 23:59
TEST 1	1-hour test scheduled by the University		
ASSIGNMENT 2, TUTORIAL QUIZ 3	Monday	February 12	by 23:59
TEST 2	1-hour test scheduled by the University		
ASSIGNMENT 3, TUTORIAL QUIZ 4	Monday	March 4	by 23:59
TEST 3	1-hour test scheduled by the University		
ASSIGNMENT 4, TUTORIAL QUIZ 5	Monday	March 18	by 23:59
TUTORIAL QUIZ 6	Monday	March 25	by 23:59
TEST 4	1-hour test scheduled by the University		
ASSIGNMENT 5, TUTORIAL QUIZ 7	Monday	April 8	by 23:59
FINAL EXAM	scheduled by the University during exam period		

For information about Carleton's academic year, including registration and withdrawal dates, see Carleton's Academic Calendar.

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.

Important Considerations

Assignments, tutorial quizzes, tests, and final exams must be completed individually. Collaboration between students is strictly disallowed and will be reported to the Dean of Science as an academic integrity offence. Penalties for such offences can be found on the ODS web page. Students must complete all coursework by themselves.

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:

- 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.

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).

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.

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 provide a copy of the **Carleton University Self-Declaration Form** (https://carleton.ca/registrar/wp-content/uploads/self-declaration.pdf). 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.

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.

Including the time spent attending lectures, completing practice problems, and working on other course material, students can expect to spend at least nine (9) hours per week on this course.

Communication

Course-related announcements will be posted in Brightspace and forwarded to students' cmail accounts. It is your responsibility to check Brightspace for any updates or announcements. It is recommended that you **check your email at least once a day**.

Students are asked to pose all questions related to course content using the official course Discord forum. **Do not send private direct messages** to the instructor and the TAs on Discord unless asked to do so.

You should **avoid emailing** the instructor directly unless the question contains confidential information or is of a personal nature. All emails regarding the course should be sent from **your Carleton email account** and should

contain "COMP1805" in the subject, along with a few words describing the content of the email**.** Due to a high volume of emails, the instructor will respond to student emails within **2 business days**. This timeframe excludes weekends, statutory holidays, and periods of University closure.

Please remember to be kind and treat your peers and the teaching team with respect. Do not post anything on our Discord that could be construed as offensive. Violations will result in loss of access privileges to these course resources and a report to Student Affairs. If you are not sure what can be considered offensive, please read this: https://carleton.ca/studentaffairs/online-conduct/.

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.

Collaboration & Academic Integrity

Everything you submit for marks in this course (i.e., assignments, quizzes, examinations, etc.) must be the result of your own work and must be completed **individually**. Collaborating on any coursework is strictly disallowed and will be reported as an academic integrity offence. You are never permitted to copy (or copy and modify) solutions (even if incomplete) from anyone or from the Internet. It is also a serious offense to help someone else commit plagiarism. You are never permitted to provide another person access to the rough work, assignment/quiz specifications, or source code that you or anyone else has written. If you suspect that someone has been able to acquire a copy of your work, then you must inform the instructor of the course immediately. Please also note that **electronic tools may be used to analyze and compare submissions** to ensure that no instances of academic misconduct have been committed.

If you are unsure of the expectations regarding academic integrity (how to use and cite references, if collaboration with lab- or classmates is permitted (and, if so, to what degree), then you must **ASK** your instructor. Sharing assignment or quiz/midterm/exam specifications/solutions 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.

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 (e.g., ChatGPT, Google Bard, Bing Chart), 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).

Undergraduate Academic Advisor

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/.

University Policies

Academic Accommodations.
Carleton is committed to providing academic accessibility for all individuals. Please review the academic accommodation available to students here: https://students.carleton.ca/course-outline/.

Student Academic Integrity Policy.
Every student should be familiar with the Carleton University Student Academic Integrity policy. A student found in violation of academic integrity standards may be sanctioned with penalties which range from a reprimand to receiving a grade of F in the course, or even being suspended or expelled from the University. Examples of punishable offences include plagiarism and unauthorized collaboration. Any such reported offences will be reviewed by the office of the Dean of Science. More information on this policy may be found on the ODS Academic Integrity page: https://carleton.ca/registrar/academic-integrity/.

Plagiarism.
As defined by Senate, "plagiarism is presenting, whether intentional or not, the ideas, expression of ideas or work of others as one's own". Such reported offences will be reviewed by the office of the Dean of Science. More information and standard sanction guidelines can be found here: https://science.carleton.ca/students/academic-integrity/.

Unauthorized Collaboration.
Senate policy states that "to ensure fairness and equity in assessment of term work, students shall not co-operate or collaborate in the completion of an academic assignment, in whole or in part, when the instructor has indicated that the assignment is to be completed on an individual basis".

Students are invited to discuss any concerns with the instructor at the earliest opportunity.