

## Course Outline

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.

## Course Information

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| <b>Instructor Name</b>     | Darryl Hill   |
| <b>Contact Information</b> | <a href="mailto:darrylhill@cunet.carleton.ca">darrylhill@cunet.carleton.ca</a>  |
| <b>Lecture Hours</b>       | Tuesday and Thursday 16:05 – 17:25 online via Zoom                              |
| <b>Course Website</b>      | <a href="https://www.carleton.ca/culearn/">https://www.carleton.ca/culearn/</a> |
| <b>Course Forum</b>        | Discord server (link is available on the course website)                        |

## Course Delivery

This course will be delivered using a blended approach. Pre-recorded lectures will be shared online to deliver primary lecture content. Scheduled lectures on Tuesdays/Thursdays will be used to revisit required material, to deliver supplementary material and to practice problems, as well as for further discussion of course concepts. **You are expected to attend the live lectures.** These scheduled lectures will also be recorded and shared online. The instructor, lab coordinator, and TAs will be available via Discord during scheduled hours to answer questions and clarify topics. Students will be required to use an alias that includes their first and last name, as listed on [cuLearn](#), in the course Discord and in any other course meetings or activities (Zoom, zyBook, etc.).

## Textbook

This semester we will be using an interactive textbook from zyBooks. Please, subscribe to the book by following instructions provided on the course website.

## Assessment Scheme

Your performance in this course is assessed using several components. These include a collection of mandatory weekly tutorial online activities, zyBook activities, five (5) assignments, four (4) tests given as online activities, and a final examination (scheduled by the registrar and given as an online activity). Final grades will be determined using the scheme described below, and **no extra credit assignments or make up tests will be provided under any circumstances.**

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| Tutorials (7 x 1% each)  | 7 %  |
| Assignments (5) - one of the assignments is optional<br>We choose 4 best assignments (5% each) to calculate your total for the assignments | 20 % |
| Tests (4 x 6% each)  | 24 % |
| zyBook participation & activities  | 9 %  |
| Final Examination  | 40 % |

Tutorials are short lessons, followed by an online activity. Attending live lectures or tutorials is not mandatory. However, **tutorial online activities are mandatory** and should be submitted via [cuLearn](#) by a specified deadline. Attendance during tutorials is encouraged as it provides a way to connect with the TAs and classmates.

**Assignments are mandatory; however, one of the five assignments is optional.** You will use [cuLearn](#) to submit your assignments. The assignment component of your final grade is computed from the score you receive on each assignment; the best four (4) assignments will be chosen to calculate your grade. You are expected to work on your

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assignments consistently once they are released (uploading your progress at least daily). As a result, you will never be granted an exemption from an assignment, even for a legitimate medical reason.

Tests will be delivered online via [cuLearn](#). You will be given a range of time to start, and once started, a limited time to finish. **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.

You will be assigned activities via an interactive textbook (provided by zyBooks). Participation in these activities will be recorded and will constitute 9% of your final grade.

It is your responsibility to ensure that your test, tutorial, and assignment marks posted to [cuLearn](#) are correct within **two weeks** of the date the marks were released. Concerns or complaints about the grading must be communicated (first to the teaching assistant, then, if the result is unsatisfactory, to the instructor) within that time. After those two weeks, all marks are considered final and will not be changed under any circumstances.

## Communication

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**Discord** will be the primary communication tool between the teaching staff and students. Since Discord is primarily a message board, it offers accessibility in terms of low bandwidth requirements and asynchronous nature (you do not have to be immediately present to benefit from the interactions of others). It also offers flexibility in terms of video and audio chat, desktop sharing, etc.

Do not let the lack of face-to-face contact isolate you. **Stay connected!** Off topic rooms on our Discord server will be available, and their use encouraged. Get to know your fellow students. Collaborate. Discussion of material, problems and approaches to solving them is highly encouraged. However, do not publicly post complete solutions, but do describe techniques, approaches, give hints, etc. And **be sure to write your own solutions**.

Unacceptable collaboration: "Here is my solution:"

Acceptable collaboration: "Have you tried using DeMorgan's law here? I found using DeMorgan's law at this part worked for me."

## Learning Outcomes

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If a student views every lecture and completes every assignment, tutorial, and reading activity, then by the end of this course that student should be able to:

- Construct arguments and formal proofs using multiple different techniques
- Solve expressions using arithmetic, propositional and predicate logic, and set theory
- Perform asymptotic analyses to describe the performance of different algorithms
- Explain the following topics:
  - conjunction, disjunction, negation, implication, existential/universal quantification
  - union, intersection, functions, relations, countability, and the universe(s) of discourse
  - time complexity, asymptotic analysis, "Big O", "Big  $\Omega$ ", and "Big  $\Theta$ "
  - sequences, sums, and graphs

## Important Considerations

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You must achieve a minimum grade of C- in COMP1805 before you will be allowed to take COMP2804.

**Late assignments are never accepted for any reason.** Assignments submissions are handled electronically (i.e., through [cuLearn](#)) and there is no "grace period" with respect to a deadline - an assignment submitted even one minute after the deadline is late and will receive a mark of zero.

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**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, you are advised to:

- **periodically upload your progress** (i.e., upload your progress at least daily)
- attempt to **submit your final submission at least one hour in advance** of the due date and time

For each assignment, you will be submitting **exactly one (1) pdf file typed/created 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", etc.) or documents in another format (e.g., "doc", "rtf", etc.) will be penalized and may receive a mark of zero.

**If any of the files you submit cannot be opened it will receive a mark of zero.** Consequently, after you upload your submission to [cuLearn](#) you must re-download it immediately and ensure that:

- your submission is the correct type of file and has the correct filename
- each of your pdf files can be opened with Adobe Acrobat Reader (for marking purposes)

You are expected to show all of 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 quiz or tutorial is offered might be granted an exemption** only if they provide a copy of the **Carleton University Self Declaration Form** (<https://carleton.ca/registrar/wp-content/uploads/self-declaration.pdf>). **Please note that a student cannot, for any reason, be exempted from more than two (2) tutorials or more than two (2) of the quizzes.** Furthermore, because assignments and reading activities are posted well in advance of their due dates, **illness does not excuse a student from completing an assignment or a reading activity.** No provision is made for missed assignments, and no extra credit assignments will be available.

## Additional Notes

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Including the time spent viewing lectures, completing practice problems, and working on other course material, students can expect to spend at least ten (10) hours per week on this course. Students are asked to pose all questions related to course content using the official course Discord server. Students should not email the instructor directly unless the question contains confidential information or is of a personal nature.

The instructor will attempt to answer every student email received within 48 hours of the time the message was received, unless the email requests information that has already been addressed in the course Discord server or in the course outline. **All emails regarding the course should be sent from your Carleton email account.** To ensure that all announcements are received, **students are expected to check their Carleton email on a daily basis.**

All materials created for this course (including, but not limited to, lecture videos and notes, in-class examples, tutorial exercises, assignments, examinations, and posted solutions) remain the intellectual property of the instructor. These materials are intended for the personal and non-transferable use of students registered in the current offering of the course. **Reposting, reproducing, or redistributing any course materials, in part or in whole, without the written consent of the instructor, is strictly prohibited.** Sharing assignment or test specifications or posting them online (to sites like Chegg, CourseHero, OneClass, etc.) is considered academic misconduct. Academic integrity offences are reported to the office of the Dean of Science. Penalties for such offences can be found on the ODS webpage: <https://science.carleton.ca/academic-integrity/>.

## Undergraduate Academic Advisor

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The Undergraduate Advisor for the School of Computer Science is available in Room 5302C HP, by telephone at 520-2600, ext. 4364 or by email at [undergraduate\\_advisor@scs.carleton.ca](mailto:undergraduate_advisor@scs.carleton.ca).

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The undergraduate advisor can assist with information about prerequisites and preclusions, course substitutions or equivalencies, understanding your academic audit and the remaining requirements for graduation. The undergraduate advisor will also refer students to appropriate resources such as the Science Student Success Centre, Learning Support Services and the Writing Tutorial Services.

**You must also read:** <http://calendar.carleton.ca/undergrad/regulations/academicregulationsoftheuniversity/>

**University Policies**

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For information about Carleton's academic year, including registration and withdrawal dates, see [Carleton's Academic Calendar](#).

**Pregnancy Obligation.** Please contact your instructor with any requests for academic accommodation during the first two weeks of class, or as soon as possible after the need for accommodation is known to exist. For more details, visit [Equity Services](#).

**Religious Obligation.** Please contact your instructor with any requests for academic accommodation during the first two weeks of class, or as soon as possible after the need for accommodation is known to exist. For more details, visit [Equity Services](#).

**Academic Accommodations for Students with Disabilities** If you have a documented disability requiring academic accommodations in this course, please contact the Paul Menton Centre for Students with Disabilities (PMC) at 613-520-6608 or [pmc@carleton.ca](mailto:pmc@carleton.ca) for a formal evaluation or contact your PMC coordinator to send your instructor your Letter of Accommodation at the beginning of the term. You must also contact the PMC no later than two weeks before the first in-class scheduled test or exam requiring accommodation (if applicable). After requesting accommodation from PMC, meet with your instructor as soon as possible to ensure accommodation arrangements are made. For more details, visit the [Paul Menton Centre](#) website.

**Survivors of Sexual Violence.** As a community, Carleton University is committed to maintaining a positive learning, working and living environment where sexual violence will not be tolerated, and survivors are supported through academic accommodations as per Carleton's Sexual Violence Policy. For more information about the services available at the university and to obtain information about sexual violence and/or support, visit: [carleton.ca/sexual-violence-support](http://carleton.ca/sexual-violence-support)

**Accommodation for Student Activities.** Carleton University recognizes the substantial benefits, both to the individual student and for the university, that result from a student participating in activities beyond the classroom experience. Reasonable accommodation must be provided to students who compete or perform at the national or international level. Please contact your instructor with any requests for academic accommodation during the first two weeks of class, or as soon as possible after the need for accommodation is known to exist. For more details, see [the policy](#).

**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 awarded penalties which range from a reprimand to receiving a grade of *F* in the course or even being expelled from the program or University. Examples of punishable offences include: plagiarism and unauthorized co-operation or collaboration. Information on this policy may be found [here](#).

**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.

**Unauthorized Co-operation or 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". Please refer to the course outline statement or the instructor concerning this issue.

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