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**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.*

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**Course Information**

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**Instructor Name**  
**Contact Information**

**Darryl Hill**  
[darrylhill@cunet.carleton.ca](mailto:darrylhill@cunet.carleton.ca)

**Lecture Hours\***  
Mondays  
5:35 – 8:35  
[YouTube/cuLearn/Discord](#)

**Office Hours**  
Tuesdays  
4:00 – 6:00  
Or by appointment

**Course Website**  
<https://www.carleton.ca/culearn/>

**Important Links**  
<https://www.carleton.ca/culearn/>

\*The lectures will be delivered via pre-recorded video (though we will experiment with live streaming, timed playback of lectures, etc). However, the Instructor will be available during lecture hours via Discord to answer questions and clarify topics.

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**Recommended Textbook**

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There is one (1) **recommended** textbook: **Lehman, E., et al. (2013). Mathematics for Computer Science.**

*(n.b., this textbook is **not required** and it is available to download for free from cuLearn)*

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**Assessment Scheme**

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Your performance in this course is assessed using several components. These include a collection of **mandatory weekly tutorial online activities** (beginning the week of May 4<sup>th</sup>), **four (4) assignments**, **four (4) quizzes given as online activities**, and a **final examination given as an online activity**. Final grades will be determined using the scheme described below, and **no extra credit assignments will be provided under any circumstances**.

Tutorials (2% each)	12 %	Assignments (3.5% each)	14 %
Quizzes (6% each)	24 %	Final Examination	50 %

**Tutorials** will be a short lesson, followed by an **online activity (done through cuLearn)**. **These tutorial activities are mandatory**. However, due to the online nature of this class, you will be given a range of time to finish said activity. **Attendance during tutorials is encouraged** as it provides a way to connect with the TA's and classmates.

**Assignments are mandatory** and 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 lowest assignment grade will not be "dropped"**. You are expected to work on your 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**.

**Quizzes will be cuLearn activities given in place of your weekly tutorial activity**. You will be given a range of time to start, and once started, a limited time to finish. They are **mandatory** and, due to the online nature of

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this class **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.**

**It is your responsibility to ensure that your quiz, 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 of 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.**

**Alternate Structured Learning**

**(i.e., what is different about this semester given the social distance restrictions of COVID-19 )**

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As you are probably aware, this offering of COMP1805 Discrete Structures I will be offered differently from past iterations. Due to the social distancing restrictions surrounding COVID-19, this iteration of COMP1805 will be delivered using an "alternate structure".

This will not be an "easy" iteration of COMP1805. You will be thoroughly assessed on your knowledge of course material, the same as any other semester.

The **core delivery** of material will consist of the following:

- 1) **Lectures** will be posted videos, most likely on **YouTube** with links on **cuLearn** and **Discord**.
- 2) **Tutorials** will consist of a short video lesson, followed by a quiz activity on **cuLearn** that must be completed by the following week.
- 3) **Assignments** will be typeset documents uploaded to **cuLearn** by the assigned date.
- 4) **Quizzes** will be activities (quiz or assignment activities) on **cuLearn** that must be done over the course of a number of hours or days.
- 5) **Office hours**, and all questions pertaining to **tutorials, lectures, quizzes, and general course material** will be conducted / answered on **Discord**.
- 6) **The final exam** will be a 2 hour quiz activity on **cuLearn**. The precise timing of delivery must be coordinated with Exam Services, and is yet to be determined.

In addition to **core delivery**, we will experiment with other means of delivery (i.e., live streaming, video chat, shared whiteboard), and adopting those that work and/or are popular. To that end, student feedback will be extremely valuable. But the **core delivery** is our contract to you for delivery of material and assessments using the most **dependable** and **accessible** methods possible.

The material will be delivered following a philosophy of

- Reliability:** Using robust, well established platforms such as cuLearn, YouTube and Discord.
- Accessibility:** Posting videos mean you can watch at your convenience, and having internet or computer problems will only limit your access temporarily. Assessments (quizzes, tutorials) will have a range of time that you may access them to account for possible technical difficulties.
- Flexibility:** If there are other technologies, platforms, or methods that can improve the student experience, we want to find and implement them. If something is not working, we want to replace it immediately with something that does.

**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.

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**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. 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."

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## Learning Outcomes

If a student views every lecture and completes every assignment and tutorial, 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**

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## Important Considerations

**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.**

**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 you 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 created using Microsoft Office, Google Docs, or LaTeX**. **Handwritten submissions (including those that have been scanned or photographed) are not acceptable 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)

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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 Medical Certificate** ([http://carleton.ca/registrar/wp-content/uploads/med\\_cert.pdf](http://carleton.ca/registrar/wp-content/uploads/med_cert.pdf)) that has been completed and signed by a physician **covering the period in question**. **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 assignment specifications 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.

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## Undergraduate Academic Advisor

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). 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/>

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## Additional Notes

**In addition to the time spent attending lectures and completing tutorials**, students can expect to spend **at least nine (9) hours per week on this course**. **Students are responsible for all course materials**, including lecture notes, tutorial exercises, and all materials discussed in class and on any of the official discussion boards.

Students are asked to **pose all questions related to course content using the official discussion boards** on cuLearn; **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 three business days** of the time the message was received, **unless the email requests information already posted** on cuLearn or in the course outline. To ensure that all announcements are received, **students are expected to check their email on a daily basis**.

**All materials created for this course** (including, but not limited to, lecture 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**.

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## Plagiarism Policy

There is a separate plagiarism policy document for this course that is located on cuLearn. **Students must read this document thoroughly** and **must agree to adhere to this policy** (and to all policies stated in this course outline) **before the assignment resources will be made available**.

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

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## Course Outline

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## University Policies

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### **Requests for Academic Accommodation**

You may need special arrangements to meet your academic obligations during the term. For an accommodation request, the processes are as follows:

#### **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 the Equity Services website:

<https://carleton.ca/equity/wp-content/uploads/Student-Guide-to-Academic-Accommodation.pdf>

#### **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 the Equity Services website:

<https://carleton.ca/equity/wp-content/uploads/Student-Guide-to-Academic-Accommodation.pdf>

#### **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.

<https://carleton.ca/pmc>

#### **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 its 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:

<https://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.

<https://carleton.ca/senate/wp-content/uploads/Accommodation-for-Student-Activities-1.pdf>

For more information on academic accommodation, please contact the departmental administrator or visit:

<https://students.carleton.ca/course-outline>