Course Outline
COMP 2804A/B for Fall 2024
Discrete Structures II

Course Information
Instructor: Pat Morin
Contact: morin@scs.carleton.ca
Classroom: Check on Carleton Central.
Lectures: Tuesdays & Thursdays, 6:05 - 8:55 (online)
Tutorials: Check your schedule on Carleton Central
Course Website: Add link to Brightspace

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

Teaching Assistants
A list of teaching assistants and their contact/office hours information will be posted once the course starts.

Course Calendar Description
A second course in discrete mathematics and discrete structures. Topics include: counting, sequences and sums, discrete probability, basic statistics, recurrence relations, randomized algorithms. Material is illustrated through examples from computing.

Prerequisite(s): COMP 1805 with a minimum grade of C-, or permission of the School of Computer Science for those in Combined Honours in Computer Science and Mathematics.

Required Textbook(s) and Other Resources
Everything needed for the course will be available for free on the course webpage..

Topics Covered and Learning Outcomes
1. Chapter 1 in the textbook: Ramsey Theory, Quick-Sort, Sperner's Theorem.
2. Product Rule, Section 3.1
3. Bijection Rule, Complement Rule, Sum Rule, The Principle of Inclusion-Exclusion, Sections 3.2, 3.3, 3.4, 3.5.
4. Binomial coefficients, Newton's Binomial Theorem, combinatorial proofs, Vandermonde's Identity, Pascal's Triangle, Sections 3.6, 3.7.
5. Sections 3.7 and 3.8., 3.9.1, 3.9.2
6. Section 3.10.1, 3.10.2, The Erdös-Szekeres Theorem
7. Section 4.1, 4.2
8. Exercise 4.38
9. MergeSort, Section 4.6.
10. Section 5.1, 5.2, 5.3
11. Section 5.5, 5.6

12. Midterm Review
13. Midterm Exam
14. Section 5.1, Exercise 5.81
15. Section 5.12.3, 5.13
16. Section 5.15, Exercises 5.85 and 5.91
17. Sections 6.1-6.5
18. Section 6.8, Exercise 6.57, Section 6.9, Section 6.8.2. Section 6.8.3.
19. Quick-Sort and random binary search trees, Section 6.10 and Section 7.1 of ODS.
20. Section 6.6, Exercise 6.35, Exercise 6.59, Section 6.7.
21. Special topic
22. Sections 7.1-7.4
23. Selected topic
24. Final exam review

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.

Assessment Scheme

Assignment 1: 6.25% due **Sunday September 22**
Assignment 2: 6.25% due **Sunday October 13**
Mid-term exam: 25% on **Wednesday October 30**
Assignment 3: 6.25% due **Sunday November 10**
Assignment 4: 6.25% due **Sunday December 1**

Final exam: 50%

Please review the Faculty of Science's Academic Integrity website for suggestions for supporting integrity.

"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.) is ALWAYS considered academic misconduct. You are NEVER permitted to post, share, or upload course materials 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/."

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 this rule is made for automated grammar and punctuation checking tools (such as Grammarly).

References to any material you use but did not originate must use the IEEE/APA/MLA citation style. Failure to reference materials correctly can result in severe penalties, and the use of manufactured (i.e., falsified) or misleading references will be treated as evidence of plagiarism and considered academic misconduct.

Everything you submit for evaluation (i.e., assignments, quizzes, tutorials, examinations, etc.) must be the result of your own work and only your own work. If you copy more than five consecutive words or any non-trivial snippet of code from a single source without providing a valid reference, then that is considered plagiarism and an example of academic misconduct.

Late assignments are never accepted for any reason. Assignments submissions are handled electronically (i.e., through Brightspace) and there is no "grace period" with respect to a deadline - an assignment submitted even one second 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:

- attempt to submit your final submission at least one hour in advance of the due date and time

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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.

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/.

- **Academic Integrity**

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: Academic Integrity | Faculty of Science (carleton.ca).

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/. Please note that content generated by an unauthorized A.I.-based tool *is* considered plagiarized material.

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".