

COMP5408: Advanced Data Structures

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About the Course

This is the home page for the graduate course Advanced Data Structures (formerly Topics in Data Structures) taught by Pat Morin in the School of Computer Science at Carleton University.

This course is about simple and easy to understand methods of data structure design and analysis that lead to efficient data structures for a variety of problems. The examples we use are selected because of their elegance and simplicity.

The course consists of three assignments, a final project, and a contribution to public knowledge. The final project is a theory or implementation project that students should choose and discuss with the instructor early in the semester. The contribution to public knowledge is a contribution to Wikipedia that adds information about one of the topics discussed in class or found while researching for the project.

Learning Modality

Content for this course is delivered in a [HyFlex classroom](#). Students who want to attend in-person can do so. Others can join via Zoom. The Zoom recordings will also be made available for offline viewing.

Important Dates

Due dates for assignments, contribution to knowledge, and the final project will be posted here.

Assignments

Assignments will be posted here as they become available.

Please note the following rules and requirements about assignments:

- Late assignments will not be accepted
- Assignments should be submitted to me as PDF files **by email**
- I will not respond to emails sent shortly before or after assignment deadlines asking for exceptions to the preceding two rules.
- You can type your solutions, or write them by hand and scan them (for example, using a scan app on your phone or using a real scanner).
- Solutions written-up in **LaTeX** are preferred, but not strictly required. In case you want to learn LaTeX, here is a **tutorial**. Learning LaTeX is a useful exercise, since **many programs (including Microsoft Word) now use LaTeX for typesetting formulas**.
- Each assignment must be submitted as one single PDF file through cuLearn.

Academic Integrity (New—Please Read)

As of 2020, there are new penalties in place for academic integrity violations. These will be issued by the Associate Dean (Undergraduate Affairs) of Science to students who copy, in whole or in part, work they submit for assignments.

- First offence: F in the course
- Second offence: One-year suspension from program
- Third offence: Expulsion from the University

These are standard penalties. More-severe penalties will be applied in cases of egregious offences. Failure to inform yourself of the expectations regarding academic integrity is not a valid excuse for violations of the policy. When in doubt, ASK your instructor or TA.

More information can be found at the **ODS website**

Grading Scheme

Class participation	10%
Assignment 1	15%
Assignment 2	15%
Assignment 3	15%
Contribution to public knowledge	15%
Final project	30%
Total	100%

Accommodation Statement

Carleton University is committed to providing access to the educational experience in order to promote academic accessibility for all individuals. Here is [information on how to apply for academic accommodation](#).

Lecture topics

The following schedule is from the Winter 2014 offering of COMP5408. Dates, videos, and topics will be updated as the course progresses.

- Lectures 1 & 2 (treaps): also see these better notes on treaps
- Lectures 3 & 4 (fractional cascading and skiplists) also see these better notes on skiplists
- Lectures 5 & 6 (persistence)
- Lectures 6, 7, & 8 (entropy)
- Lecture 9 (splay trees)
- Lecture 10 (van Emde Boas trees)
- Lecture 10–11 (x-fast and y-fast tries)
- Lecture 12 (cell-probe lower-bounds)
- Lecture 13, 14, and 15 (data structures for strings)
- Lecture 18 (universal hashing and dynamic perfect hashing)
- Lecture 19 (cuckoo hashing and retrieval-only maps)
- Lecture 20 (the planar separator theorem and distance oracles)

