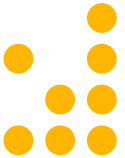

MACM 101

Discrete Mathematics I

Hello! I'm your instructor!!

Matt Amy

- B.Math in Computer Science (Minor in Pure Mathematics), University of Waterloo
- M.Math in Computer Science (Quantum information), University of Waterloo
- Ph.D in Computer Science, University of Waterloo

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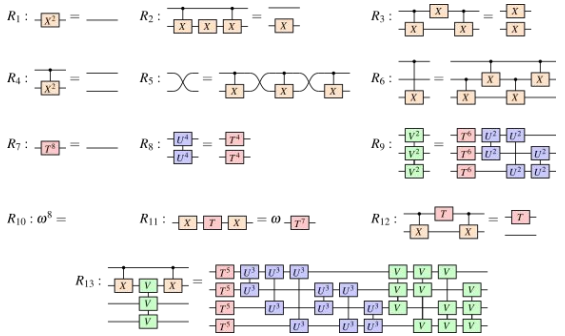
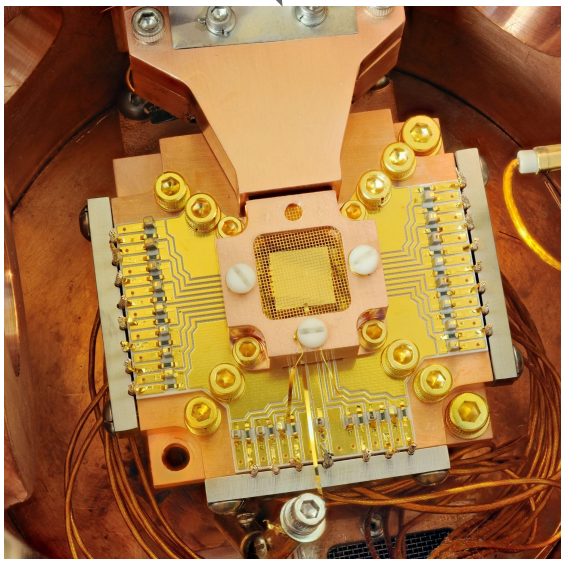
What I do

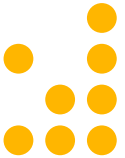
- Canada Research Chair in Quantum Computing
- I work on **automated reasoning** and **programming languages** for **quantum computers**



```
include "cphase.qasm";
family(n) qft(x:Qbit[n]) {
    for i=0..n-1 do {
        h(x[i]);
        for j=i+1..n-1 do {
            cphase(j-1+1)(x[i], x[j])
        }
    }
}
```



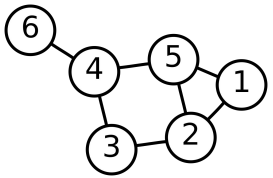
Today's agenda



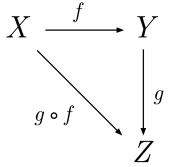
- Discrete mathematics
- Housekeeping and course policies

What is discrete mathematics?

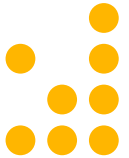
- …**Not** calculus?...
- The study of **discrete structures** & their properties
  - Integers — 1,2,3,...
  - Sets — {1, 2, {3,4}, }
  - Graphs



  - Logic — ∀x. P(x) => Q(x)
  - Prog. Languages — t := x | λx.t | t(s)
  - Abstract algebra — M = (S,e,+) s.t. (a+b)+c=a+(b+c), a+e=a=e+a
  - Category theory

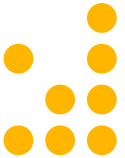


Why do we care?



- Provides a formal basis for studying and reasoning about discrete things, like algorithms and computation
  - How to formally prove that "sorting takes at least O(nlog n) time"?
- Provides a foundation for mathematics and mathematical reasoning
  - What is a mathematical object?
  - What is a proof? What can or can't be proved?
  - Intuitionistic vs classical logic → **philosophy of mathematics**
- Everything becomes discrete in the end anyway
  - (algebraic) topology
  - **Stone duality → logic = topology**

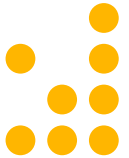
Course topics



- **Logic & formal reasoning (4 weeks)**
- **Sets, functions, and relations (2-3 weeks)**
- **Integers and number theory (2-3 weeks)**
- **Graphs and trees (2 weeks)**

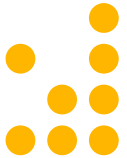
No: category theory, topology, or intuitionistic logic (probably)

Course overview



- **Course website**
  - https://www2.cs.sfu.ca/~meamy/Teaching/macm101
  - Canvas has been exploded
- **Lectures**
  - M/W/F 12:30-1:20 in AQ3181
- **Tutorials/labs**
  - Check goSFU for your scheduled time & location
  - **No labs this week!**
- **Office hours**
  - Directly after class in 3181 or nearby
  - TA office hours to be announced

How to learn



- **Lectures** (M/W/F 12:30-1:20 in AQ3181)
  - Overview of course material
- **Tutorials**
  - Worked out problems
- **Weekly activities**
  - Textbook readings posted to the website
  - Homework problems (**ungraded, submit Thursday 11:59pm for completion mark**)
    - 10 minute **in-class** quiz on Friday based on homework problems
- **Piazza discussions (https://piazza.com/sfu.ca/summer2026/macm101)**
  - Post questions to the teaching team and your classmates
  - **Helping your classmates is a great way to learn!**

Grading scheme

	Percentage
Homework due Thursdays at 11:59pm For completion marks only	**5%**
Weekly 10 minute quizzes In class on Fridays	**10%**
Two in-class midterms June 19th & July 17th (tentatively)	**35%**
Final Exam Date to be announced	**50%**

Only top 8/10 count

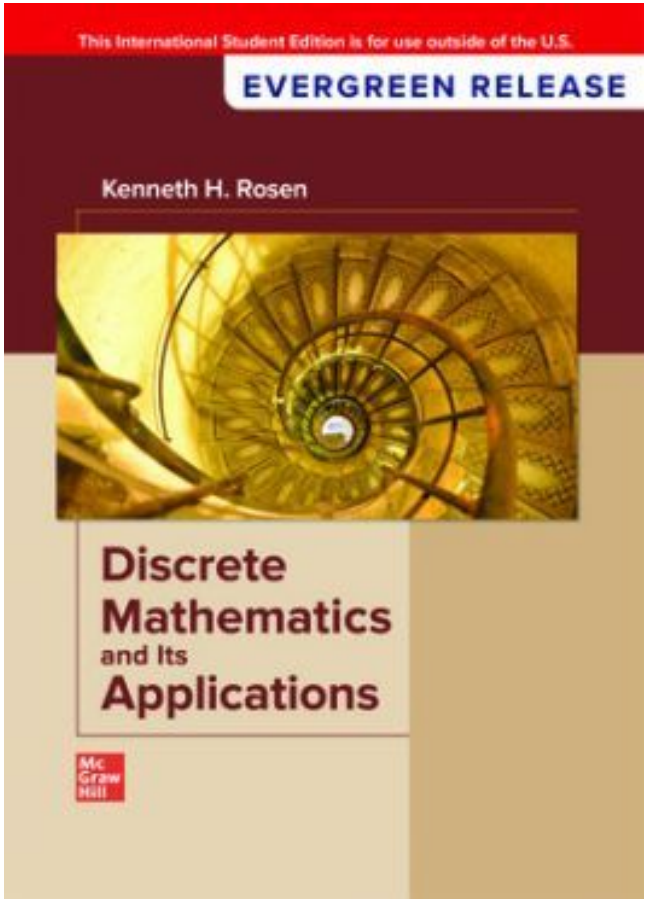
Students must attain an overall passing grade on the weighted average of exams in the course in order to obtain a clear pass (C- or better).

Students must pass the final exam for a pass (D or better)

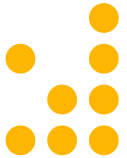
Textbook

Rosen - *Discrete Mathematics & its Applications*

- 8th or 7th edition
- Roughly cover chapters 1,2,4,5, and 9



Academic Integrity



- Cheating is bad
- Assignments are ungraded
  - But still try to solve yourself and without chatGPT
- Quizzes/exams are individual
- See SFU's Academic Integrity Tutorial to understand what is considered cheating and what is not.

Questions?