

# Math Foundations of Computer Science

CS 200

# About Me

- Shelby Kimmel (call me Professor Kimmel, Professor)
- **My research:** (quantum) Algorithms and Complexity
- **Academic Background:** Williams undergrad, MIT grad school, University of Maryland postdoc
- **Non-academic Background:** internships at Raytheon, Fulbright (English Teaching Assistant) South Korea

# This Class:

You will learn about mathematical ideas and techniques that are useful for computer science. This will help you to communicate clearly with other computer scientists and programmers, and understand many of the more complex concepts in computer science.

## Learning Goals

- Ability to think like a computer scientist (using the tools of mathematics).
- Ability to communicate like a computer scientist (using the language of mathematics).
- Proficiency using common mathematical tools of computer science.

Find a partner or two, and brainstorm as many responses as you can to the following question:

- What is an example of a connection between math and computer science?

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- Learning is the process of developing new connections between neurons in your brain.
- New connections are created by repeatedly practicing new behavior. By practicing any task, can rewire your brain to become “smart” at that skill.
- Trying to do a task for the first time can sometimes feel unpleasant...

# Take-aways

- Give yourself time
  - No cramming
  - Don't start problem set the day before it is due
- Try to embrace the feeling of difficulty
  - That is when you are learning
  - Don't give up



# Take-aways

- Practice the skills you need
  - Practice problems are better than reading over notes to prepare for quiz

# Learning from growth mindset perspective

<b>Fixed Mindset</b>	<b>Growth Mindset</b>
Task A is easy because I'm smart.	This is easy because my brain already has necessary connections.
Task B hard because I'm bad at this type of thinking.	This is hard because I need to create connections in my brain that weren't there before.

# Self-test

	<b>Fixed Mindset Reaction</b>	<b>Growth Mindset Reaction</b>
<b>Challenges</b>	Avoid	Embrace
<b>Effort</b>	Problem	Progress
<b>Criticism</b>	Personal	Helpful
<b>Failure</b>	Evidence of inability	Temporary
<b>Success of others</b>	Threatening	Inspiring

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- Developing a growth mindset will tend to increase your learning (grade) and make learning more enjoyable.
- Learning takes time and practice.

# Active Learning

- In class, I will often ask you to solve problems and answer questions. (This helps you to build new connections in your brain.)
- Because you are learning, I don't expect you to answer correctly. Won't be graded on response (other than for participation)
- Opportunity for you to get feedback on whether you understand.
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# Syllabus – with a partner:

- Each person reads one page, then explains key points to partner.
- What are 3 questions you have about the syllabus?



# Syllabus – with a partner:

- Questions similar to quiz questions:
  - What is the purpose of the problem set reflection?
  - What is my policy on technology in the classroom and why?
  - How should you use the Discussion section of Canvas?
  - If you have difficulty with a problem set problem, which of the following options are acceptable?
    - go to office hours
    - go to tutoring hours
    - e-mail me
    - discuss with a classmate
    - look online for solutions
    - do the best you can, write on your problem set what you tried, look at my solution when doing the self-grade, reflect on why you struggled in the reflection, and re-solve the problem or similar problems to prepare for the quiz

# Syllabus – with a partner:

- Solution:
  - If you have difficulty with a problem set problem, which of the following options are acceptable?
    - go to office hours - YES
    - go to tutoring hours - YES
    - e-mail me - NO
    - discuss with a classmate - YES
    - look online for solutions – SIMILAR PROBLEMS OK, SAME NOT OK
    - do the best you can, write on your problem set what you tried, look at my solution when doing the self-grade, reflect on why you struggled in the reflection, and re-solve the problem or similar problems to prepare for the quiz - YES

# Website tour!

[go/CS200](https://go/CS200)

# Announcements

- Taken a lot of math classes? You might not need this class
- Pre-Quiz due today by midnight
- Fill out questionnaire by Friday
- Quiz Friday on syllabus
- First problem set due Monday
- Not registered – come talk to me.