Lecture 0: Course Overview

Rafael Oliveira

University of Waterloo
Cheriton School of Computer Science

rafael.oliveira.teaching@gmail.com

September 9, 2020

Overview

- Introduction
  - What is this course about?
  - What to expect from me?
  - What do I expect from you?
  - Guidelines

- Logistics
  - Structure of Lectures
  - Homework
  - Final Project
  - Student drop-in hours
  - Questions?

What is this course about?

In your first algorithms/optimization/data structures course, you learned some of the following:

What is this course about?

In your first algorithms/optimization/data structures course, you learned some of the following:

- combinatorial techniques (divide-and-conquer, greedy algorithms, dynamic programming, local search, etc.)
- data structures (heaps, balanced trees, etc.)

The techniques above emphasized **two computational models** (sequential & deterministic computation, query model).

What is this course about?

In your first algorithms/optimization/data structures course, you learned some of the following:

- combinatorial techniques (divide-and-conquer, greedy algorithms, dynamic programming, local search, etc.)
- data structures (heaps, balanced trees, etc.)

The techniques above emphasized **two computational models** (sequential & deterministic computation, query model).

This course aims to use the algorithmic lens to:

What is this course about?

In your first algorithms/optimization/data structures course, you learned some of the following:

- combinatorial techniques (divide-and-conquer, greedy algorithms, dynamic programming, local search, etc.)
- data structures (heaps, balanced trees, etc.)

The techniques above emphasized **two computational models** (sequential & deterministic computation, query model).

This course aims to use the algorithmic lens to:

- explore several models of computation (deterministic, randomized, parallel, distributed, memory-efficient, online, interactive)

What is this course about?

In your first algorithms/optimization/data structures course, you learned some of the following:

- combinatorial techniques (divide-and-conquer, greedy algorithms, dynamic programming, local search, etc.)
- data structures (heaps, balanced trees, etc.)

The techniques above emphasized **two computational models** (sequential & deterministic computation, query model).

This course aims to use the algorithmic lens to:

- explore several models of computation (deterministic, randomized, parallel, distributed, memory-efficient, online, interactive)
- expand your algorithmic toolkit (analytic techniques, use of randomness, amortized analysis, dealing with NP-complete problems, etc.)

What to expect from me?

Here is what you can expect from me:

- Give lectures
- Provide homework which helps you understand the material better
- Be present during student drop-in hours
- Help you with choosing your final project topic
- Give feedback on you final project mid way
- Be active on Piazza (to the extent that I will be able to, without hurting the points above)

What to expect from me?

Here is what you can expect from me:

- Give lectures
- Provide homework which helps you understand the material better
- Be present during student drop-in hours
- Help you with choosing your final project topic
- Give feedback on you final project mid way
- Be active on Piazza (to the extent that I will be able to, without hurting the points above)

I care much more about your **learning** rather than your **grades**. I also care much more about your **exploration** of this vast field of algorithm design and analysis rather than **forcing on you** any opinion on what are the "important algorithms." So I am trying to design a course which will reflect that.

What do I expect from you?

If you are taking the class, I expect that you:

- Do the homework
- Participate in class (asking questions, correcting me, etc.)
- Always ask yourself: "why is this important? Why should I care?"
- Explore the topics, and/or some area that fascinates you!
- Always keep an open mind!
- Be kind to your classmates, to the TAs and myself
- Participate on Piazza (asking question, answering your classmates' questions if you know the answer)
- Provide me feedback on how the course is going
- Let me know if any problems arise during the term, so we can help as soon as possible.

What do I expect from you?

If you are taking the class, I expect that you:

- Do the homework
- Participate in class (asking questions, correcting me, etc.)
- Always ask yourself: "why is this important? Why should I care?"
- Explore the topics, and/or some area that fascinates you!
- Always keep an open mind!
- Be kind to your classmates, to the TAs and myself
- Participate on Piazza (asking question, answering your classmates' questions if you know the answer)
- Provide me feedback on how the course is going
- Let me know if any problems arise during the term, so we can help as soon as possible.

There will be no participation points, as we are doing this online and people may not be available during the class times, etc.

Guidelines for the course

Please read

`https://cs.uwaterloo.ca/~r5olivei/courses/2020-fall-cs466/`
`guidelines/`

Structure of lectures

Lectures will be live, but in (somewhat) asynchronous format (to benefit everyone). This means:

- Each lecture will have the same duration as a regular lecture
- However, each lecture will be divided into 2-3 parts (not necessarily same duration) with short breaks in between
- Videos will be posted on youtube shortly after lecture (please let me know if you **cannot** access youtube!)
- We will use **zoom** for lectures, and links will be provided on Piazza

Homework

We will have 5 sets of homework for this class. See *assignments* section in
`https://cs.uwaterloo.ca/~r5olivei/courses/2020-fall-cs466/`.

Homework

We will have 5 sets of homework for this class. See *assignments* section in
`https://cs.uwaterloo.ca/~r5olivei/courses/2020-fall-cs466/`.

Due dates:

- September 25th
- October 9th
- October 30th
- November 13th
- November 27th

Homework

We will have 5 sets of homework for this class. See *assignments* section in
https://cs.uwaterloo.ca/~r5olivei/courses/2020-fall-cs466/.

Due dates:

- September 25th
- October 9th
- October 30th
- November 13th
- November 27th

Each homework will have n questions, where $n \sim 6$ and you will be
required to turn in only $n - 1$ of them. Please list collaborators.

Homework

We will have 5 sets of homework for this class. See *assignments* section in
https://cs.uwaterloo.ca/~r5olivei/courses/2020-fall-cs466/.

Due dates:

- September 25th
- October 9th
- October 30th
- November 13th
- November 27th

Each homework will have n questions, where $n \sim 6$ and you will be
required to turn in only $n - 1$ of them. Please list collaborators.

In addition, I will post practice problems (won't be graded/don't turn in)
which are selected so that you can get a better understanding of the
material. I am a strong believer that we only *learn by doing*.

Final Project

```
https://cs.uwaterloo.ca/~r5olivei/courses/2020-fall-cs466/
final-project/
```

- Topic of your choice (see page above for suggestions)
- Undergraduates can pair up for final project (not mandatory to pair though)
- Goal: work on an open problem and/or present a survey on a problem or area of your choice within algorithm design.
- To turn in: project report (around 10 pages - see LaTeX template)
- Individual work: each student will be required to do a 15 min presentation on their project, and then there will be a 15 min period for questions (by me and the TAs)

Student drop-in hours

(For now) I will hold student drop-in hours on Mondays from 4pm-5pm and on Fridays from 12:30pm-1:30pm. This should comfortably cover all the time zones that the students from the class are in. Other times could be set by appointment.

You are always welcome to attend the drop-in hours to ask questions about the course, about the final project, and about research in general. My drop-in hours will be hosted via zoom, and a link for the will be posted on Piazza.

For the TAs student drop-in hours, please take the Piazza poll on preferences for timing, and we will do our best to accommodate what suits everyone best.

Questions?