Lecture 0: Course Overview

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Overview

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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 (amortized analysis, use of randomness, 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 very present/interactive during student drop-in hours
- Do my best to have many and helpful problem solving sessions
- Help you with choosing your final project topic
- Give feedback on you final project mid way
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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 to expect from the TA and myself

- This class, albeit difficult, is not designed in an adversarial format

  We are here to help you learn and grow, and we are very happy and excited to do so!

- Use us (and one another) as a resource for this class!
- Ask questions in class
- Come to office hours and ask questions
- Start your work early!! This has many benefits:
  - Allows you to ask us questions if you don't understand the homework problem statements
  - Your brain will be unconsciously working on the material
  - You have more chances to come to office hours and ask questions
  - You will minimize your stress of clutch-time homework solving (which is not great for your learning)
- Also use office hours for feedback on how to write solutions (this is also an important part of learning)

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 TA and myself
- Participate a lot 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.

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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/2021-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**

Purpose of Lectures and Homework

The purpose of a story is not to hold your attention,
but to put you back doing your work, inner and outer.
A story is not for presenting some explicit meaning,
and it is not for anyone's entertainment.

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The purpose of a lecture is not to exhaustively explain the entirety of a concept,
but to give you a basic understanding of the material
and instigate your own exploration, of the material and of yourself.

The purpose of homework isn't to automatically repeat what was taugh,
but for you to go a bit further in your understanding and (meta-) skills.

Homework

We will have 5 sets of homework for this class. See *assignments* section in
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Each homework will have n questions, where $n \sim 6$ and you will be
required to turn in only $n - 1$ of them.

If you turn them all in, we will take the best $n - 1$ grades.

Please list sources used and collaborators.

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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*.

Homework Submissions

- We will use crowdmark for homework submissions
- We strongly recommend you to write your solutions in LaTeX.
- If you are handwritting your solution, please:
    1. Write in a *clearly legible* manner
    2. Take a very good picture of your solution (one where we can clearly read and understand what you wrote)
    3. Illegible solutions will be given a *zero* mark

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  3. Illegible solutions will be given a *zero* mark
- Solutions will be posted within 5 days after the homework is due.
- We will do our best to grade your homework within *14 days after submission*
- Late submissions will be dealt with as follows: each late day will have a penalty of 25% on your total grade for that homework.

Final Project

`https://cs.uwaterloo.ca/~r5olivei/courses/2021-fall-cs466/`
`final-project/`

- Topic of your choice (see page above for suggestions)
  I must approve the topic though!
- Anyone 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 20 min presentation on their project, and then there will be a 10 min period for questions (by me and perhaps the TA)

Student drop-in hours

(For now) I will hold

- student drop-in hours on *Tuesdays and Thursdays from 5pm-6pm*

This should comfortably cover all the time zones that the students from the class are in (that I know of). 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.

TA student drop-in hours (starting after September 20th): will be decided and announced on Piazza.
Links to all student drop-in hours will be posted on Piazza.

Piazza Policy

- We strongly encourage everyone to interact a lot on Piazza
- Whenever you have a question about the material or the HW, please ask them in public mode (as chances are other students also have same question).
- To encourage participation, the TA and myself will wait for $\sim 6h$ before answering a question on Piazza, so that you have a chance to collaboratively work through it.
- I will do my best to answer lecture-related questions on piazza with the timeline above as well
- Please **do not expect** the TA and myself to be active on Piazza at late hours (say from 10pm until 9am)
- **Do not expect** the TA to answer Piazza questions *over the weekend*.

Questions/Comments from Survey

- The technical items on the survey was to gauge prior knowledge distribution amongst the class.
  It will help me pace myself during the times I introduce these new concepts, and to provide better practice problems.
- I will always try to put examples in lecture, and cover examples in the office hours. If I don't cover enough, be sure to ask me or the TAs on Piazza or office hours! Benefit of office hours is that I can record the examples during it.
- *Warning*: this course, based on feedback from previous versions, will be an intense experience. So make sure you are prepared for it.
- *Second warning:* due to # topics involved, fair amount of "context switching" between homeworks, which makes the class challenging
- Bonus questions: apart from practice problems and homework problems, I will not add bonus questions. If you want bonus problems, working on your final project as a research project should be quite fullfilling.
  My belief/philosophy is that research $>>$ hard bonus problems.

Questions/Comments from Survey

- I tried putting as much auxiliary material as I could in the "other resources" section of the course webpage.
  Please take a look at these, and if you need more places to look at, let me know and I am glad to point you to the material.
- Also, after each lecture I acknowledge my sources used to prepare the lecture, so that could also be a source for you to look further.
- Another place to look for auxiliary material is the course webpage in the lectures section - there I also list some auxiliary notes.
- As mentioned in the beginning, this course will cover a broader and deeper set of concepts from CS 341 (building upon it)

Questions?