Welcome to CSci 4041

Algorithms and Data Structures

Figure from Chaslot (2006)
Instructor (me)

James Parker
Shepherd Labs 391

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Teaching Assistant

Pariya Babaie, Jayant Gupta, Song Liu, Anoop Shukla, Nikolaos Stefas, Kshitij Tayal, Nitin Varyani
Introduction to Algorithms, Cormen et al., 3rd edition
Discussion sections

No discussion on Friday (don't come, no one will be there)

These will typically reinforce the topics of the week (or exam review)

The TAs may do exercises, so bring something to write on
Class website

www.cs.umn.edu/academics/classes
Or google “umn.edu csci class”

Syllabus, schedule, other goodies

Moodle page will have grades and Possibly homework submission
CSci 4041H: Algorithms and Data Structures

Class Announcements

- 09/08/2015
  ALL YOUR BASE ARE BELONG TO US.
Syllabus

30% Homework
20% Programming assignments
25% Midterm (Oct. 24)
25% Final (Dec. 16)?

(No late homework; must ask for extension 48hr before deadline)
Syllabus

Class

Final
30% Homework
20% Programming assignments
25% Midterm (Oct. 24)
25% Final (Dec. 16)? (Dec. 12)

(No late homework; must ask for extension 48hr before deadline)
Programming vote

C/C++?

Java?

Python?
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Schedule

Ch. 1, 2, 3: Introduction
Ch. 2.1, 2.3, 7, 8: Sequences and Sets
Ch. 6, 9, 13, 32: More Sequences and Sets
Ch. 22, 23, 24, 25, 26: Graph Algorithms
Ch. 33: Geometric Algorithms
Ch. 4.2, 30, 31: Algebraic and Numeric Alg.
Ch. 34: NP-Completeness
Syllabus

Any questions?
Major topics:
- Learn lots of algorithms
- Decide which algorithm is most appropriate
- Find asymptotic runtime and prove an algorithm works (mathy)
Algorithms

We assume you can program.

This class focuses on improving your ability to make code run faster by picking the correct algorithm.

This is a crucial skill for large code.
Algorithms

We will do a pretty thorough job of sorting algorithms.

After that we will touch interesting or important algorithms.

The goal is to expose you to a wide range of ways to solve problems.
Algorithms

Quite often there is not a single algorithm that always performs best.

Most of the time there are trade-offs: some algorithms are fast, some use more/less memory, some take use parallel computing...
A major point of this class is to tell how scalable algorithms are.

If you have a 2MB input text file and your program runs in 2 min ... what if you input a 5MB file?

... 20 MB file?
Algorithms

In addition to using math to find the speed of algorithms, we will prove algorithms correctly find the answer. This is called the “correctness” of an algorithm (and often will be proof-by-induction).
Next time...

Thursday will be a “review” of things you should already know (Ch. 3)

We will often have ungraded in-class exercises, so please bring something to jot notes on