Computer Science & Engineering 423/823
Design and Analysis of Algorithms

Lecture 00 — Course Introduction

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Administrivia

- Overrides, if needed, will be granted on a priority basis; if you need an override, see me after class
- Syllabus

Overview

- This course studies **design** and **analysis** of algorithms
  - **Design:** Methods used to create new algorithms to solve problems (e.g. greedy, dynamic programming, divide and conquer)
  - **Analysis:** Mathematical (as opposed to empirical) assessment of an algorithm's **correctness** and **efficiency**

Correctness and Efficiency

- **Correctness:** Does the algorithm do what it is supposed to do *on all inputs*?
  - Could be an infinite or exponential number of inputs, so cannot typically do this empirically
- **Efficiency:** Measuring the algorithm's **running time**
  - Count number of basic operations (e.g. number of comparisons in sorting)

Efficiency

- Typically focus on the **worst-case**, **asymptotic** performance
- E.g. an algorithm with an input of size n takes $O(n^2)$ time steps on *all* inputs
- Other analyses, such as **average case**, can be done but are not as common