

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