What is Computing?
Computing: internet, e-mail, network…
Computing: Productivity...
Computing: Entertainment…
Computing: Entertainment...
“Computer science is no more about computers than astronomy is about telescopes”

- Edsger Dijkstra
Cutting Edge Computer Science
Mapping the Edgenome

Scientists have begun to map some of these epigenetic markers, including CG methylation, a small part of the genome.

In CG methylation, a small part of the genome is scanned for DNA methylation.

In this genome scan, a small part of the genome is scanned for DNA methylation.

In this genome scan, a small part of the genome is scanned for DNA methylation.
Chinook

- Chinook is the World Man-Machine Checkers Champion, developed by researchers at the University of Alberta.
- It earned this title by competing in human tournaments, winning the right to play for the (human) world championship, and eventually defeating the best players in the world.
- The developers have fully analyzed the game of checkers and have the complete game tree for it.
  - Perfect play on both sides results in a tie.
- “One Jump Ahead: Challenging Human Supremacy in Checkers” Jonathan Schaeffer, University of Alberta (496 pages, Springer. $34.95, 1998).
Autonomous Cars

Legend
With Driver: Enacted | Executive Order | In Progress
Driverless: Enacted | Executive Order | In Progress
Driverless assuming already enacted with driver
2011 Jeopardy!

- In February 2011, IBM Watson bested Brad Rutter (biggest all-time money winner) and Ken Jennings (longest winning streak)
- IBM is currently applying Watson’s technology to medical diagnosis and legal research
Robot Soccer

UPennalizers
Robot Soccer Team
Areas in Computer Science

- Artificial Intelligence
- Robotics
- Human-Computer Interaction
- Computer Graphics
- Computer Vision
- Operating Systems
- Computer Networking
- Databases
- Computer Security
- Ubiquitous Computing
What is Computer Science?

Computer science is the study of solving problems using computation.

- Computers are part of it, but the emphasis is on the problem solving aspect.

Computer scientists work across disciplines:

- Mathematics
- Biology (bioinformatics)
- Chemistry
- Physics
- Geology
- Geoscience
- Archeology
- Psychology
- Sociology
- Cognitive Science
- Medicine/Surgery
- Engineering
- Linguistics
- Art
- …
Computing is important
After ~10 years, we’ll finally have to change this slide! Welcome to the future.
Computing is Consistently Ranked Among the Best Occupations

CS-Related Jobs Highlighted in Red

The 25 Best Jobs of 2017

#1 Software Developer
#2 Dentist
#3 Physician’s Assistant
#4 Nurse Practitioner
#5 Orthodontist
#6 Statistician
#7 Pediatrician
#8 Obstetrician and Gynecologist
#8 Oral and Maxillofacial Surgeon
#8 Physician

CS Careers Rank Highly In:

• Job satisfaction
• Salary
• Work/life balance

• Growth potential
• Employment rate
• Work environment
...many different companies … need to hire computer scientists. They aren't tied to one particular industry.
Computing has consequences
Energy Consumption by Country inc. Ethereum

Bitcoin and Ethereum are by far the largest proof-of-work based coins, it is also worth considering their combined ranking.

Energy Consumption by Country inc. Bitcoin & Ethereum
Jackie Wang

“This Is a Story About Nerds and Cops”: PredPol and Algorithmic Policing
Administrivia
CIS 1100: Introduction to Programming and Computer Science

Goals:
- How can we use computers to solve problems?
- How can we formulate problems so that we can solve them via computation?

Topics:
- Programming in Java
- Computer organization and assembly language
- Applications to science, engineering, and art

“Computers are incredibly fast, accurate, and stupid; humans are incredibly slow, inaccurate, and brilliant; together they are powerful beyond imagination.” — Albert Einstein
Masking

- Lecture:
  - Strongly recommended! Especially now at the start of the semester. I’m wearing one!

- Office Hours:
  - Strongly recommended! You’re elbow to elbow with a bunch of strangers…

- Recitation:
  - Up to your recitation TAs. **May be mandatory!** You will hear on day 1 of your recitation.
The Basics

Instructor: Eric Fouh

- Eric’s Regular Office Hours: TBA
- efouh@seas.upenn.edu

Instructor: Harry Smith

- Harry’s Regular Office Hours:
  - For homework: Monday 10:30-11:45AM, Wednesday 3:00-4:00PM in Levine 269C
  - For anything and everything else: sharry.youcanbook.me
  - sharry@seas.upenn.edu

Only email the instructors for personal or sensitive communication; everything else should be sent through Piazza.

TA Office Hours:

- Help with debugging
- Office Hours on OHQ.io, Mon-Thurs 3:30pm-9:30pmish (full schedule TBD soon!)
- Only use Ed, office hours, or email to contact your TAs.
  - Do not email a TA unless you’ve spoken with them directly about it ahead of time.

Full details: www.cis1100.com
Reaching Out To Course Staff

CIS 1100 has about 350 students this semester.

We have two instructors and ~40 TAs.

You will be part of a recitation with at most 19 other students.

If you need support in the course, please reach out to instructors & Head TAs!
But: PLEASE MAKE SURE TO CONTACT YOUR RECITATION TAs, TOO!
Grading

Grade Breakdown:
- 8 Homeworks + Project: 64%
- Exam 1: 11%
- Exam 2: 11%
- Recitation Attendance: 6%
- Check-in Quizzes: 6%
- Code Reviews: 2%

Exam 1: Monday, October 24th

Exam 2: Monday, November 21st

Notes:
- You can check your grades on GradeScope
Recitation

- Mandatory!
- You must be registered for exactly **one recitation section**
  - Some sections are 1 hour, others are 2 hours.
  - 2 hour recitations are designed to give more support to students who anticipate needing it.
  - You can pick which type you want.
  - As long as you are registered for one recitation section, you are set to go.
- Benefits of recitation:
  - Review course material
  - Get TA mentorship
  - Small class environment: make friends, get more attention from instructor.
Course Materials

Course Website: www.cis1100.com
- Programming assignments and checklists
- Course schedule
- Lecture slides

Interactive lecture notes available in Codio
What You Need To Know in CIS 1100

- Everything covered during lectures.
- Everything contained in the homework assignments.
- Everything covered during recitation.

What You Will Find Helpful, But Isn’t Mandatory

- Codio Lecture Notes (the assignments with colorful logos)
Homework Programming Assignments

Due: **11:59pm on Wednesday nights on Gradescope**
- 4 late days to use throughout semester (max 2 per homework)
- No other late submissions allowed
- Lowest homework dropped
- See course webpage for other policies

Computing equipment:
- Your desktop/laptop
- Codio
Advice

- Start on HWs early! Debugging can take time.
- Office hours are less crowded if you show up early in the week
- Do not hesitate to ask for help. If you have been trying to debug something for an hour and are getting frustrated, remember that we are there to help you.
- Your best sources for help are the instructors, the TAs and Piazza (NOT GOOGLE!)
- Please read and follow the collaboration policy
- **Do not use Stack Overflow or other online discussion boards**
Action Items

1. Register for Codio!
2. Familiarize yourself with the course rhythm:
   1. Lecture MWF & Recitation M or T
   2. HWs due Wednesdays
   3. Rinse and repeat
Navigating Codio
When you first open a project:

Looks like you don’t have any files open right now. Click a file from the file tree to open it, or create a new file.

Some other things to try:
- Open a Terminal window: Tools→Terminal menu or Shift+Alt+T
- Open any file by typing its name File→Open File menu or Ctrl+O
- Create multiple code editing panels: View→Panels
- Information about the Box: Project→Box info menu
- Install languages, databases and other software: Tools→Install Software menu
- Uploading your Box public keys to Github or BitBucket: Codio→Account menu then select Applications
- Find and upload your public keys to any remote server: Codio→Account menu then select SSH Keys
Looks like you don't have any files open right now.
Click a file from the file tree to open it, or create a new file.

Some other things to try...

- Open a Terminal window: Tools->Terminal menu or Shift+Alt+T
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The HelloWorld.java (an empty file) is now open in the editor for editing!
This is the Syllabus page of the website.

CIS 110 - Introduction to Computer Programming

CIS 110 Syllabus

- This is a tentative syllabus and schedule. Topics, reading assignments, and due dates are subject to change. This syllabus will be updated throughout the semester, so please reload this page before lectures to get the up to date version.
- Lecture recordings are available to registered students on the course canvas page. Recordings are added within an hour of lecture's end.

<table>
<thead>
<tr>
<th>Date</th>
<th>Topics</th>
<th>Exam Code</th>
<th>HW Assigned</th>
<th>HW Due</th>
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<th>Announcements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wed, Jan 20, 2021</td>
<td>Introduction</td>
<td>HelloWorld</td>
<td></td>
<td></td>
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<td>First Day of Classes!</td>
</tr>
<tr>
<td>Fri, Jan 22, 2021</td>
<td>Drawing</td>
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<tr>
<td>Mon, Jan 25, 2021</td>
<td>Variables &amp; Types</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
/** Name: Harry Smith
 * PennKey: sharry
 * Execution: java HelloWorld
 * Prints "Hello, World!". By tradition, this is everyone's first program.
 * */

public class HelloWorld {
    /**
     * This is a comment, it is not code.
     */

    // this is also a comment
    public static void main(String args[]) {
    }
}
/* Name: Harry Smith
 * PennKey: sharry
 * Execution: java HelloWorld
 * Prints "Hello, World!". By tradition, this is everyone's first
 */

public class HelloWorld {
    /**
     * This is a comment
     *
     *
     * this is also a comment
     */

    public static void main(String args[]) {
    }
}
Our First Program
Learning Objectives

● To be familiar with the structure of a Java program
● To be familiar with print commands
● To be familiar with comments
● To write a program that prints something
● To recognize and fix common syntax errors
public class HelloWorld {

    /**
     * This is a comment, it is not code.
     */

    // this is also a comment

    public static void main(String args[]) {

        Code goes here!

    }
}


public class HelloWorld {
  /**
   * This is a comment, it is not code.
   */

  // this is also a comment

  public static void main(String args[]) {
                      
                Code goes here!
                      
  }
}
public class HelloWorld {

  /**
   * This is a comment, it is not code.
   */

  // this is also a comment

  public static void main(String args[]) {

    // Code goes here!

  }

}
public class HelloWorld {

    /**
     * This is a comment, it is not code.
     */

    // this is also a comment

    public static void main(String args[]) {

        // Code goes here!
        // This is called “the body of our main method.”

    }
}
Java keywords. Beyond the scope of this course

A Java program is a class. More on classes later

The name of your program

The main method declaration. More on this later

public class MyClass
{
  public static void main(String[] args)
  {
    // Put your code here!
  }
}

Curly braces are used to start and end class definitions and method definitions

every open curly brace { must have a matched close curly brace }

Java keywords. Beyond the scope of this course
Print commands

- Display information on the screen
- Two types of print commands:
  - `System.out.println(value)`: prints the value followed by a new line (ln)
  - `System.out.print(value)`: prints the value without advancing to the next line
Print text

- prints out the characters between the first " and the second " followed by a new line

```
System.out.println("Hello world");
```

A semicolon ends the command (statement)

```
jshell> System.out.println("Hello world ");
Hello world
```

```
jshell> 
```
public class MyClass
{
    public static void main(String[] args)
    {
        System.out.println("Hello world!");
    }
}
Comments

- `//` is used to mark the beginning of a comment (single-line)
- `/* ... */` is used for multi-line comments
- The compiler (program that runs your program!) skips comments
- Comments are used to make notes to ourself and to annotate the code

```java
/* MyClass.java
   Programmer: My Name
   Date: 
*/

int max = 10; // this keeps track of the max score
```
The filetree

All files you use will live here. You can click on them to show them in the editor.

Compile button
Click this button to compile all .java files in your filetree.

View Running Program Button
Shows you the visual output of your program.

Looks like you don’t have any files open right now. Click a file from the file tree to open it, or create a new file.

Some other things to try:
- Open a Terminal window: Tools->Terminal menu or Shift+Alt+T
- Open any file by typing its name File->Open File menu or Ctrl+O
- Create multiple code editing panels: View->Panels
- Information about the Box: Project->Box info menu
- Install languages, databases and other software: Tools->Install Software menu
- Uploading your Box public keys to GitHub or BitBucket: Codio->Account menu then select Applications
- Find and upload your public keys to any remote server: Codio->Account menu then select SSH Keys
**The Terminal**
This is space where we can write individual commands to communicate with the computer.
Running our program:
We typed “java” followed by our program's name ("HelloWorld"). Then hit enter.

The Output:
Whatever we asked our program to print will appear on the following line(s). In this case, our program prints “Hello, World!”
Syntax Errors

- The compiler report errors
- Most common errors are syntax errors
- A syntax error is reported when the code is not correctly written
- Common Syntax errors:
  - Missing a semicolon (;) at the end of a statement
  - Open curly brace ({}), or quote (""') or parenthesis () without a matching closing brace ({}), quote (""') or parenthesis ()
  - Naming your program/class incorrectly