CIS 110
Introduction to Computer Programming
Eric Fouh & Harry Smith

www.cis110.com
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
G nucleotides sit next to each other.

Chromosome 22
Of the 23 pairs of chromosomes in the human genome, 22 is the second smallest, containing only about 2 percent of DNA in the genome.

Genes
Some of the known genes from Chromosome 22 that fall within the tested areas are shown outside the chart. CpG methylation is one of several epigenetic factors that is

Variation among tissues
Each concentric ring of bar chart represents a different tissue, from muscle cells to sperm cells. Methylation levels that are significantly above or below the average level across all of the tissues are highlighted, indicating possible cell-specific differences.

20% or morP above avgP.
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

As of 2016

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

Penn’s Autonomous Car
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

Aibo League

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
Annual Total U.S. STEM Jobs Thru 2022 vs. Recent College Grads

Computing is Consistently Ranked Among the Best Occupations

CS Careers Rank Highly In:
• Job satisfaction
• Salary
• Work/life balance

The 25 Best Jobs of 2017

<table>
<thead>
<tr>
<th>#1</th>
<th>Software Developer</th>
</tr>
</thead>
<tbody>
<tr>
<td>#6</td>
<td>Statistician</td>
</tr>
<tr>
<td>#2</td>
<td>Dentist</td>
</tr>
<tr>
<td>#7</td>
<td>Pediatrician</td>
</tr>
<tr>
<td>#3</td>
<td>Physician’s Assistant</td>
</tr>
<tr>
<td>#8</td>
<td>Obstetrician and Gynecologist</td>
</tr>
<tr>
<td>#4</td>
<td>Nurse Practitioner</td>
</tr>
<tr>
<td>#8</td>
<td>Oral and Maxillofacial Surgeon</td>
</tr>
<tr>
<td>#5</td>
<td>Orthodontist</td>
</tr>
<tr>
<td>#8</td>
<td>Physician</td>
</tr>
</tbody>
</table>

CNN’s Top 100 Jobs 2010

(Graphic by Focus.com)
Many different companies ... need to hire computer scientists. They aren't tied to one particular industry.
Overview

**CIS 110: 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
# Online Tools to Know

<table>
<thead>
<tr>
<th>Tool</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Piazza</strong></td>
<td>Online Q&amp;A forum for rapid support on HW and course material.</td>
</tr>
<tr>
<td><strong>Codio</strong></td>
<td>Website for writing your code!</td>
</tr>
<tr>
<td><strong>Canvas</strong></td>
<td>Video Lectures &amp; Live Coding Session recordings hosted here. Access to important policies and links.</td>
</tr>
<tr>
<td><strong>Gradescope</strong></td>
<td>Online assignment submission portal. Homeworks, Quizzes, Assignments submitted &amp; graded here.</td>
</tr>
<tr>
<td><strong>Zoom</strong></td>
<td>Video conferencing software. All live or “face-to-face” meetings happen over Zoom.</td>
</tr>
</tbody>
</table>
cis110.com vs. Canvas

<table>
<thead>
<tr>
<th>cis110.com</th>
<th>Canvas</th>
</tr>
</thead>
<tbody>
<tr>
<td>Course website. HW writeups live here. Fast access to important policies and links.</td>
<td>Video Lectures &amp; Live Coding Session recordings hosted here. Access to important policies and links.</td>
</tr>
</tbody>
</table>

Overlap?

Short answer: Canvas holds the videos, cis110.com holds the homework instructions. Course information can be found on both sites. Both are accurate.

Longer answer: Normally, CIS 110 runs without using Canvas for anything important. In the online setting, we use it to host our videos. Your other classes are likely using Canvas, too. Other CIS courses use a similar website to cis110.com, and we want to introduce you to that system for your future courses. So we make both available to you for all your course information needs.
**cis110.com vs. Canvas**

**cis110.com**
- Homework Instructions
- Course Staff List
- Course Policies
- Syllabus
- Calendar
- Links to course videos
- Office Hour Queue
- Wellness, Diversity, & Inclusion Resources
- Links to Piazza, Gradescope, and Codio

**Canvas**
- Lecture Videos with Summaries & Learning Objectives
- Exams
The Basics

Instructors: Eric Fouh and Harry Smith

- Regular Instructor Office Hours:
  - Eric’s: 10:30am-12:30pm on Tuesdays
  - Harry’s: 8-9am and 5-6pm on Thursdays
- Links to Zoom meetings on course website.

- Strongly prefer Piazza to email; post a private message to Piazza instead with a subject starting with “[PROF]” and limit the visibility to Harry Smith & Eric Fouh (or just all Instructors to include TAs)

TA Office Hours:

- Help with debugging
- All office hours are posted on the course web site
- Enter the office hours queue here
  - Put a link to your own Zoom meeting room in the Topic section
- Only use Piazza, office hours, or email to contact your TAs

Full details: www.cis110.com
How the Course is Delivered

**Video Lectures**
- Recorded by Eric or Harry
- 15 minutes per topic, typically one topic covered per week.
- Introduces concepts and definitions needed for Live Coding sessions throughout the week
- Followed by quiz to check for understanding

**Live Coding Sessions**
- Hosted by Eric or Harry
- Held every Monday, Wednesday, and Friday:
  - Monday and Friday: 12pm
  - Wednesday: 11am
- Attendance is OPTIONAL but students attending can participate
- Instructor leads class through completing a problem
- Recording available afterwards.
- Solution to one Live Coding problem to be submitted each week.
OPTIONAL Textbook

skim before lecture;
read thoroughly afterwards
Grading

Grade Breakdown:

- Homeworks: 60%
- Midterm Exam 1: 10%
- Midterm Exam 2: 10%
- Quizzes: 12%
- Live Coding Submissions: 8%

Exam 1: *Friday October 23 on Canvas*

Exam 2: *Friday December 4 on Canvas*

Notes:

- You can check your grades on GradeScope
Homework Programming Assignments

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

**Purpose:** Homework assignments are how you will develop your programming skills. There’s no substitute for writing code!

**How to Complete**

- All of your programming will be done on Codio.
  - Nothing to install!
- Submitting on Gradescope.
Collaboration Policy

Our policy for collaboration on work is detailed at this link. You are responsible for viewing it on your own, and you’ll be quizzed on it.

Purpose: Homework assignments are how you will develop your programming skills. There’s no substitute for writing code!

Consequences for violating:

- First offence: 50% grade deduction on assignment, student can elect to escalate to Office of Student Conduct
- Subsequent offences: 0% received for assignment grade, automatic referral to Office of Student Conduct.
Quizzes

Due: Every week, before the first Live Coding Session of that week. In general, this is 11:59 AM each Monday.

Purpose: Show the instructors that you’ve watched the relevant lectures for the coming week’s Live Coding topics. Check for yourself that you understood the material in the lectures.

How to Complete: Quizzes will be completed on Gradescope. These should typically take about 10 minutes. If you’re stuck for a while, reach out to a TA or Instructor!
Live Coding Submissions

Due: Every Sunday at 11:59PM.

Purpose: Show the instructors that you’ve attended the Live Coding Sessions each week. This is where we expand on the basics covered in Lecture Videos, so we want to make sure you’re following along.

How to Complete: You’ll submit your copy of one of the problems we solve in a week on Gradescope. We will identify for you which session’s problem you’ll submit in a week. The work that you submit is done by following along with the Live Coding Session, so this should not take more than a few minutes to complete and submit each week.
Quizzes
Quick check for understanding about Lecture Videos. Due every week before first Live Coding session (almost always Monday, 11:59am)

Midterm Exam 1
Online Canvas Exam, held Friday October 23

Midterm Exam 2
Online Canvas Exam, held Friday December 4

Live Coding Submissions
Submitting the work completed while watching or attending Live Coding Sessions. Due Sunday at 11:59 PM every week.

Grade Breakdown

Homework
Due Thursday at 11:59 PM almost every week

- Quizzes: 40%
- Live Coding Submissions: 60%
- Midterm Exam 1: 10%
- Midterm Exam 2: 10%
- Homework: 8%
## Timing Breakdown

All times local to Penn (EDT until Nov 1, EST afterwards)

<table>
<thead>
<tr>
<th>Course Material</th>
<th>M</th>
<th>T</th>
<th>W</th>
<th>Th</th>
<th>F</th>
<th>Sa</th>
<th>Su</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Live Coding (12 PM)</td>
<td>TA Office Hours</td>
<td>Live Coding (11 AM)</td>
<td>TA Office Hours</td>
<td>Live Coding (12 PM)</td>
<td>TA Office Hours</td>
<td>Sunday Review Session</td>
</tr>
<tr>
<td></td>
<td>TA Office Hours</td>
<td>Eric’s Office Hours (10:30 AM-12:30 PM)</td>
<td>TA Office Hours</td>
<td>Next week’s Lecture released</td>
<td>TA Office Hours</td>
<td>TA Office Hours</td>
<td>TA Office Hours</td>
</tr>
<tr>
<td>What’s Due</td>
<td>Quiz Due by 12 PM</td>
<td></td>
<td></td>
<td>HW Due by 11:59 PM</td>
<td></td>
<td></td>
<td>Live Coding Submission Due by 11:59 PM</td>
</tr>
</tbody>
</table>

**Rule of Threes:** only three things to submit in a week, and only three hours of Lecture + Live Coding to view.
Advice

- Start on HWs early! Debugging can take time.
- Back up your work like crazy – Codio does some of this for you but it can crash.
- Office hours are less crowded if you attend shortly after assignments are released

- 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.

- Please read and follow the collaboration policy
- Do not use Stack Overflow or other online discussion boards