CIS 110

Introduction to Computer Programming

Eric Fouh & Harry Smith

www.cis110.com

What is Computing?

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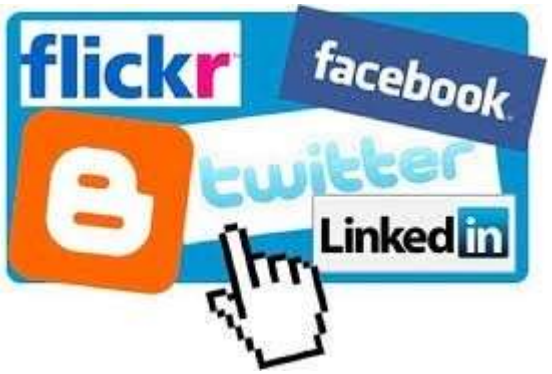
Computing: internet, e-mail, network…



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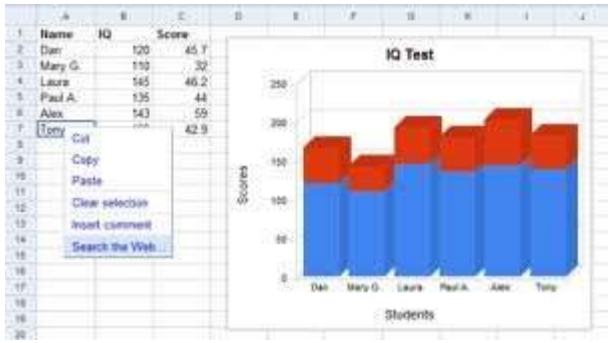
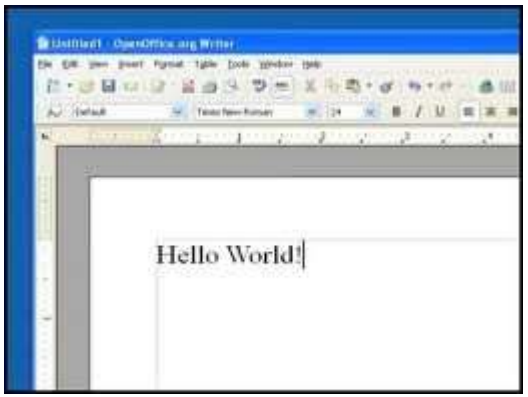
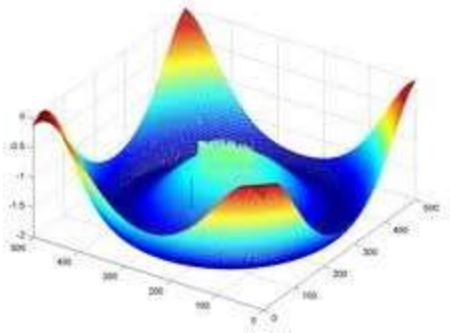
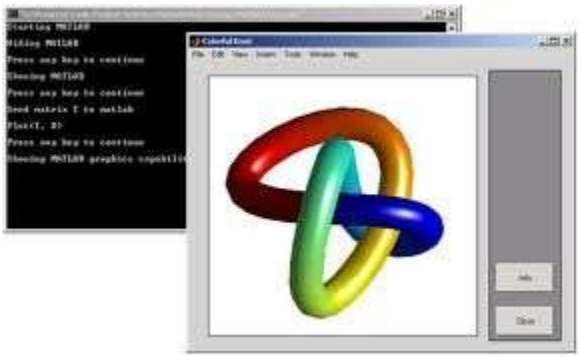
Computing: Productivity…









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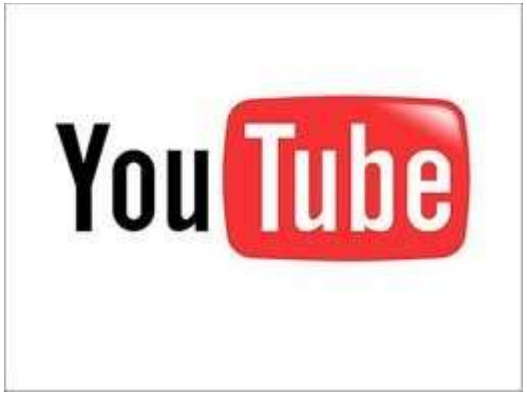
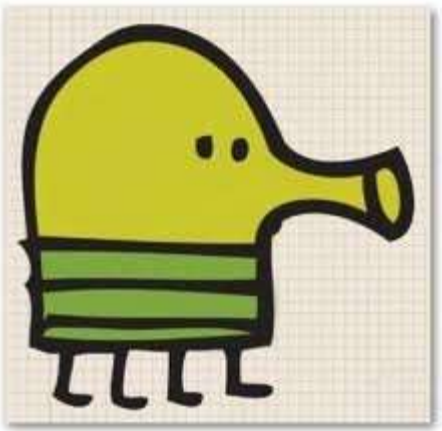
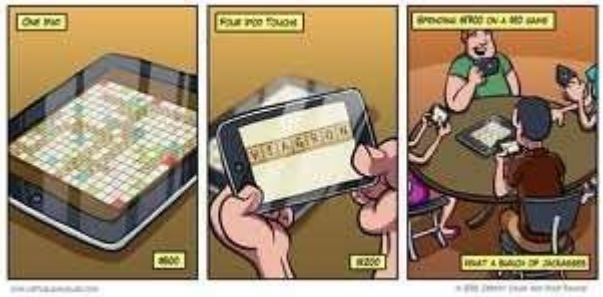
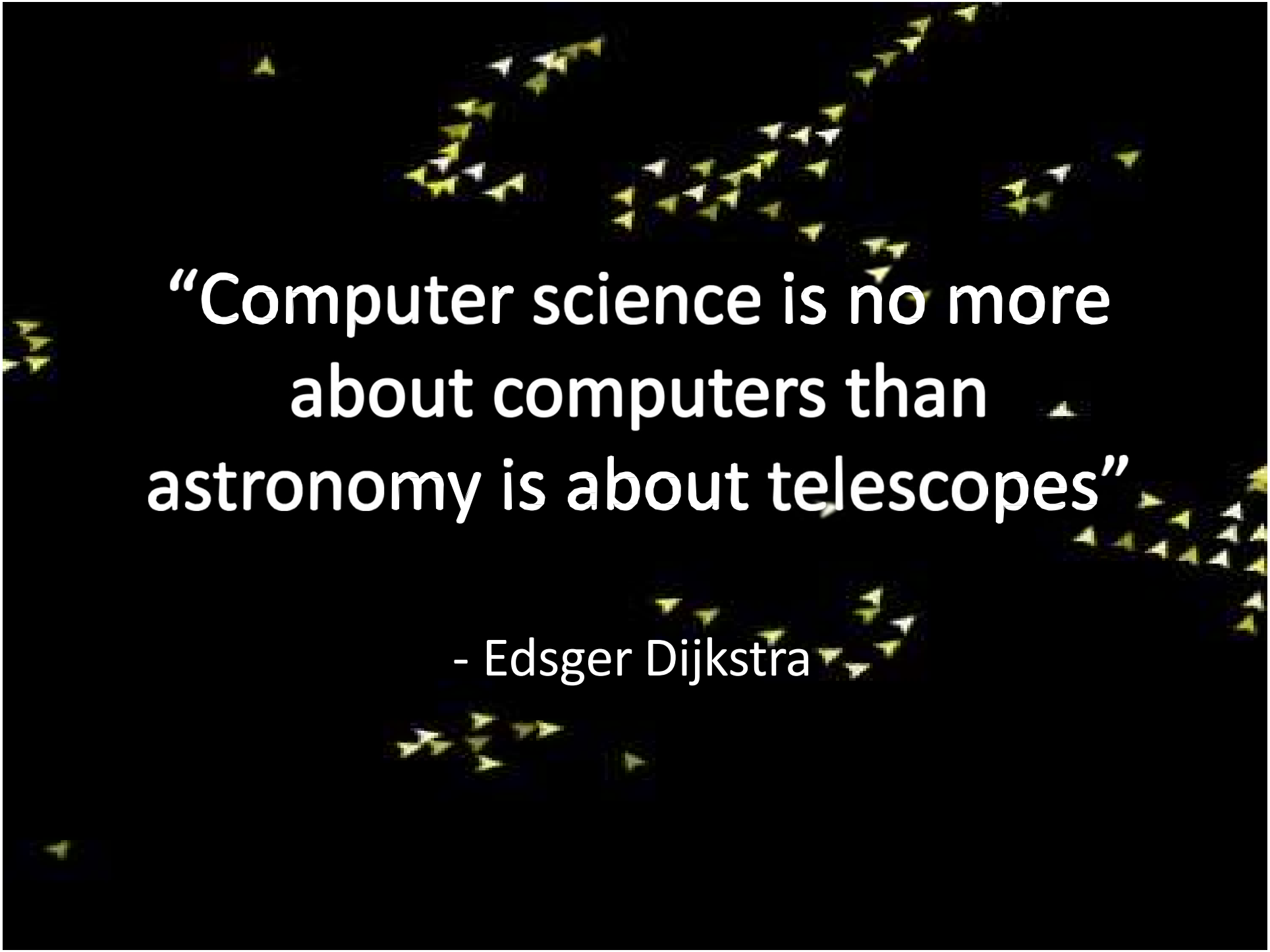
Computing: Entertainment…



Computing: Entertainment…






“Computer science is no more about computers than astronomy is about telescopes”
- Edsger Dijkstra

Cutting Edge Computer Science

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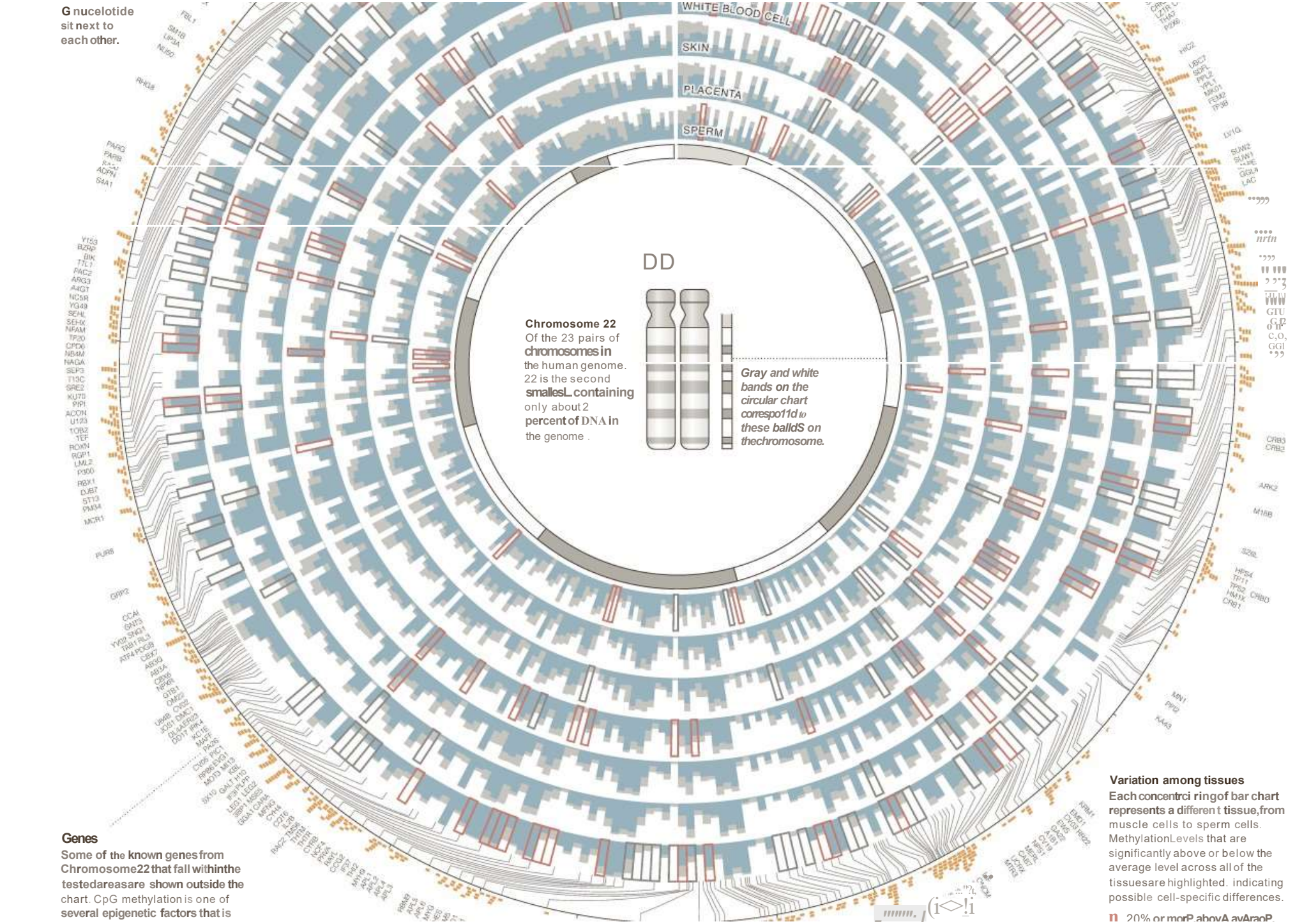


G nucelotide sit next to each other.

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

Gray and white bands on the circular chart correspo11d to these balldS on thechromosome.

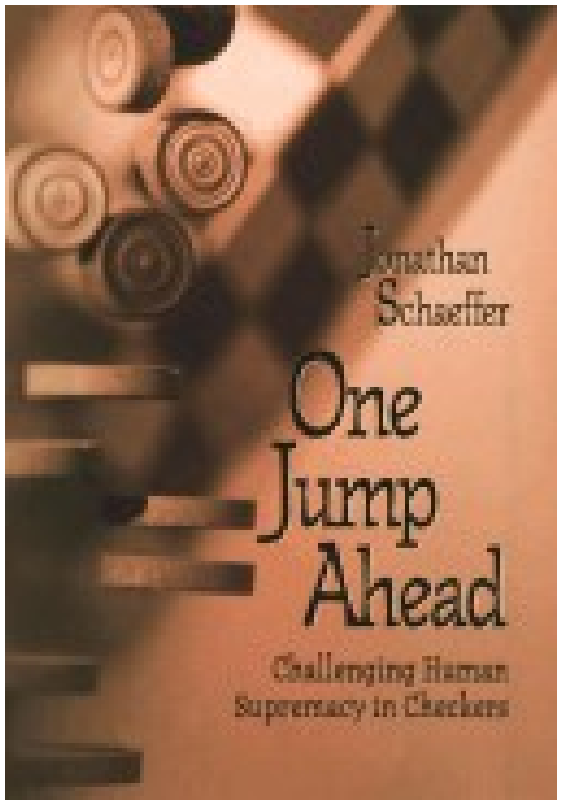
Genes
Some of the known genes from Chromosome22 that fall withinthe testedareasare shown outside the chart. CpG methylation is one of several epigenetic factors that is

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

n 20% or morP abovA avAraoP.

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.
- Visit http://www.cs.ualberta.ca/~chinook/ to play a version of Chinook over the Internet.
- 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).



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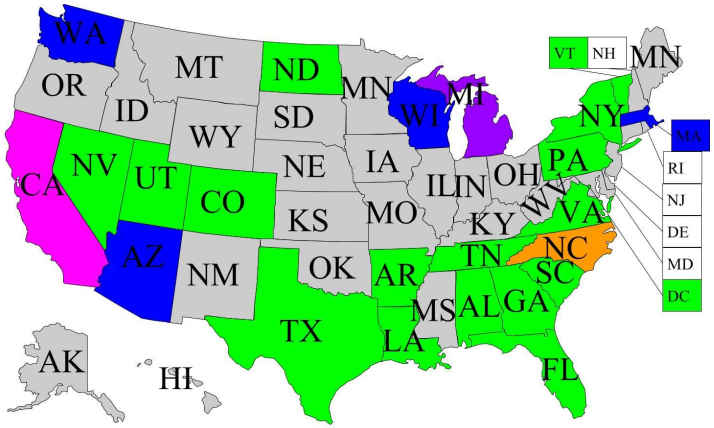
Autonomous Cars



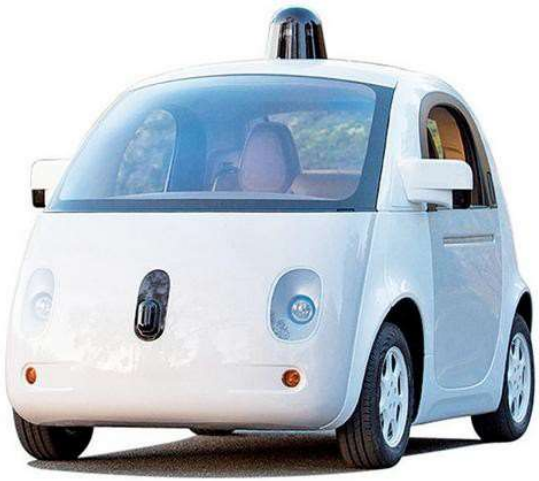
As of 2016

Legend

With Driver: Enacted | Executive Order | In Progress

Driverless: Enacted | Executive Order | In Progress

Driverless assuming already enacted with driver



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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

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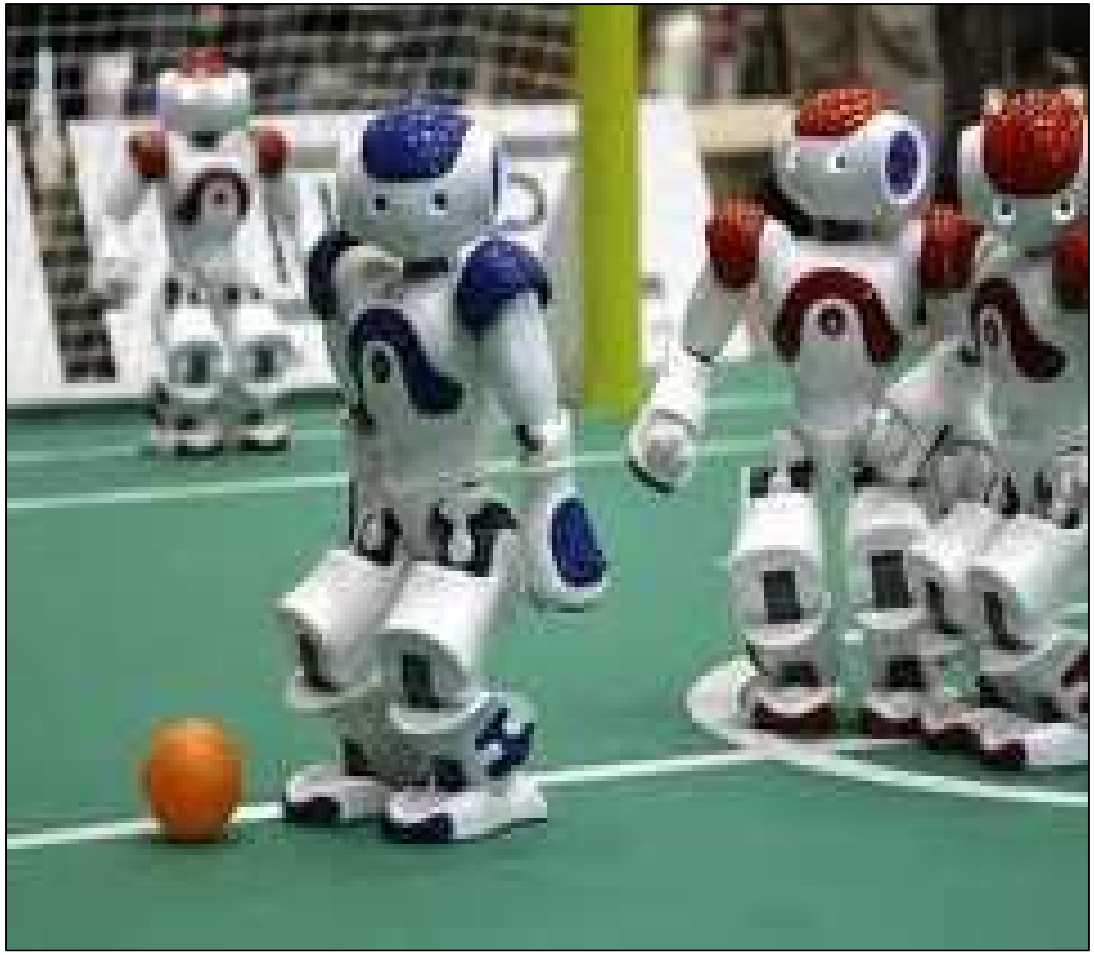
Robot Soccer



Aibo League

UPennalizers
Robot Soccer Team

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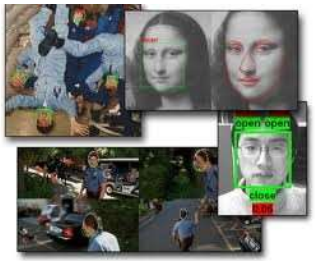
Areas in Computer Science

Artificial Intelligence

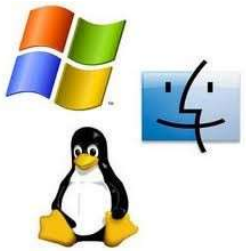
Robotics

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	Geoscience	Medicine/Surgery
Biology (bioinformatics)	Archeology	Engineering
Chemistry	Psychology	Linguistics
Physics	Sociology	Art
Geology	Cognitive Science	…

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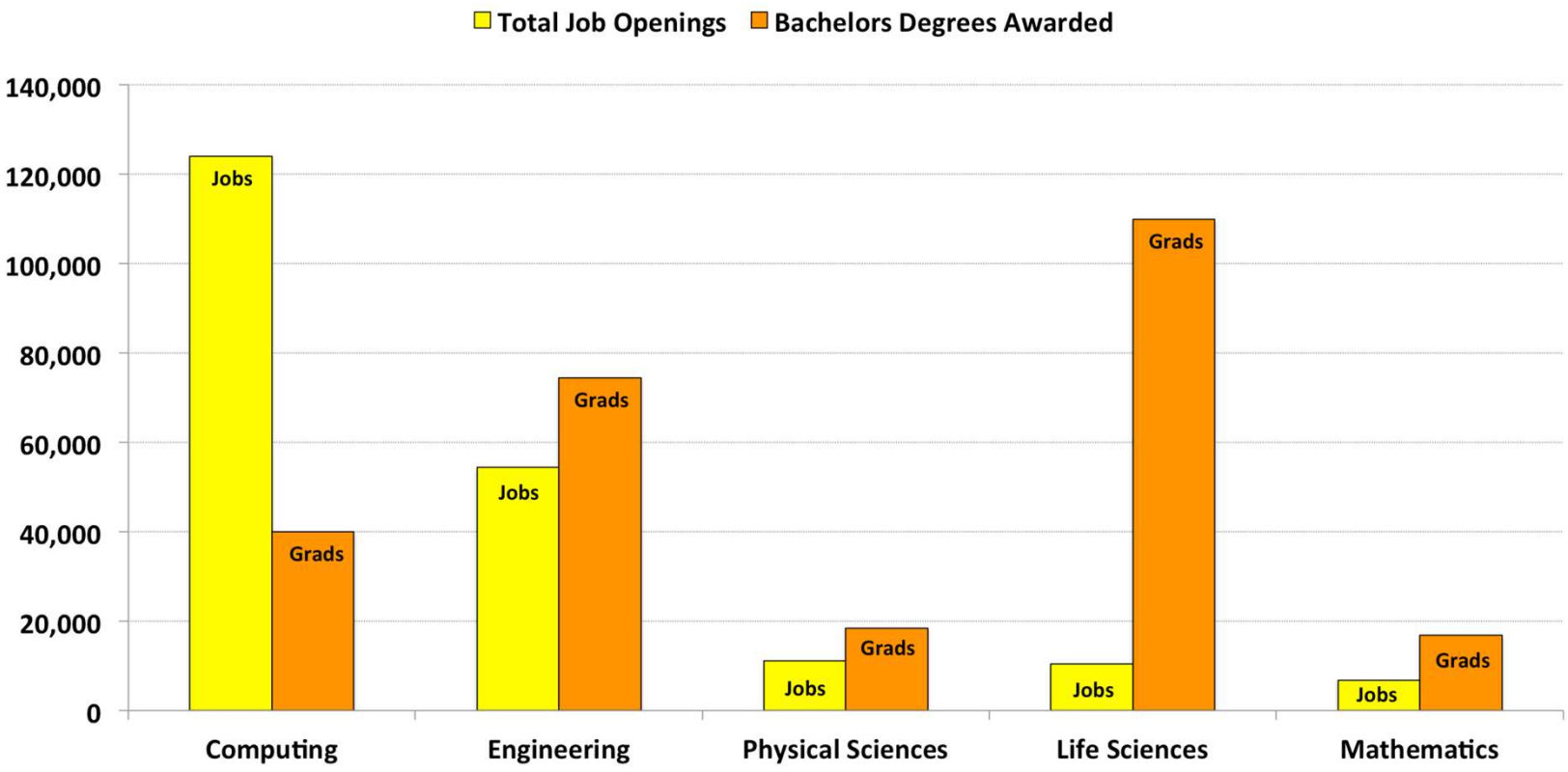
Computing is important

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



Data Sources: US-BLS Employment Projections, 2012-2022 (*www.bls.gov/emp/ep_table_102.htm*)
National Science Foundation NCSES (*www.nsf.gov/statistics/nsf13327/pdf/tab26.pdf, tab33.pdf, tab34.pdf, tab35.pdf, tab46.pdf*)

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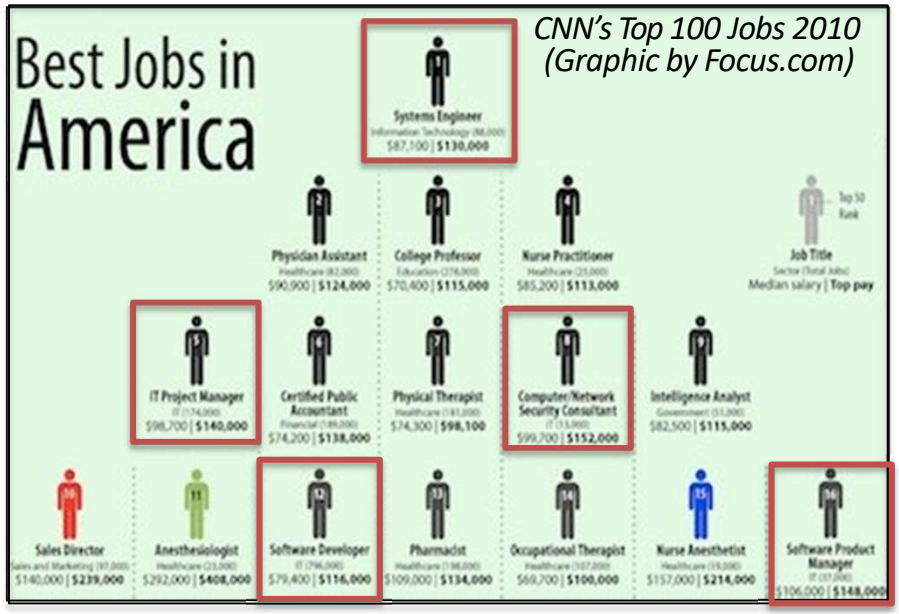
Computing is Consistently Ranked Among the Best Occupations

CS-Related Jobs Highlighted in Red



The 25 Best Jobs of 2017

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

CS Careers Rank Highly In:

- Job satisfaction
- Salary
- Work/life balance
- Growth potential
- Employment rate
- Work environment

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Computer science tops list of best major for jobs

BY RACHEL GOTTFRIED

Computer science graduates now get more offers of employment than any other major. This is the first time since 2008 that computer science has topped the list: previously, accounting majors had the highest offer rate.

In 2011, 56.2% of computer science majors received job offers, compared to only 53.8% of accounting majors. The offer rate for computer science majors increased 13.8% this year from the previous year.

Computer science and accounting majors are in high demand because both are needed in a wide range of industries.

"There are many different companies that need to hire computer scientists," said Mimi Collins, director of communications at the National Association of Colleges and Employers.

"They aren't tied to one particular industry—majors like nursing do not enjoy that benefit."

Although this is good news for computer science grads, it might not be for the computer industry. According to Collins, "One computer science graduate may have 10 offers as opposed to one accounting graduate that's getting five offers." So, computer science majors may be getting more offers, but this is only because there is a shortage of people who graduate with such a degree.

According to Collins, companies like to hire recent graduates because they have the latest skills.

"Things change very quickly, especially in computer science," said Collins. "Many organizations have a formal track where they want to bring in new college graduates and train them the way they want them to be trained."

Annabelle Evans graduated as a computer science major from the University of Southern California in 2008. "When I picked my major, I knew there wouldn't be a lack of jobs as a computer scientist,

Evans now works at Google.

…many different companies … need to hire computer scientists. They aren't tied to one particular industry.

Administrivia

Overview

CIS 110: Introduction to Programming and Computer Science

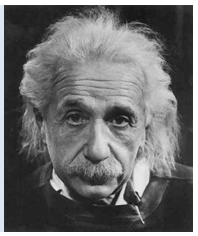
Goals:

- 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*



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Online Tools to Know

cis110.com

Course website. HW writeups live here. Fast access to important policies and links.

Canvas

Video Lectures & Live Coding Session recordings hosted here. Access to important policies and links.

Piazza

Online Q&A forum for rapid support on HW and course material.

Gradescope

Online assignment submission portal. Homeworks, Quizzes, Assignments submitted & graded here.

Codio

Website for writing your code!

Zoom

Video conferencing software. All live or “face-to-face” meetings happen over Zoom.

cis110.com vs. Canvas

cis110.com

Course website. HW writeups live here. Fast access to important policies and links.

Canvas

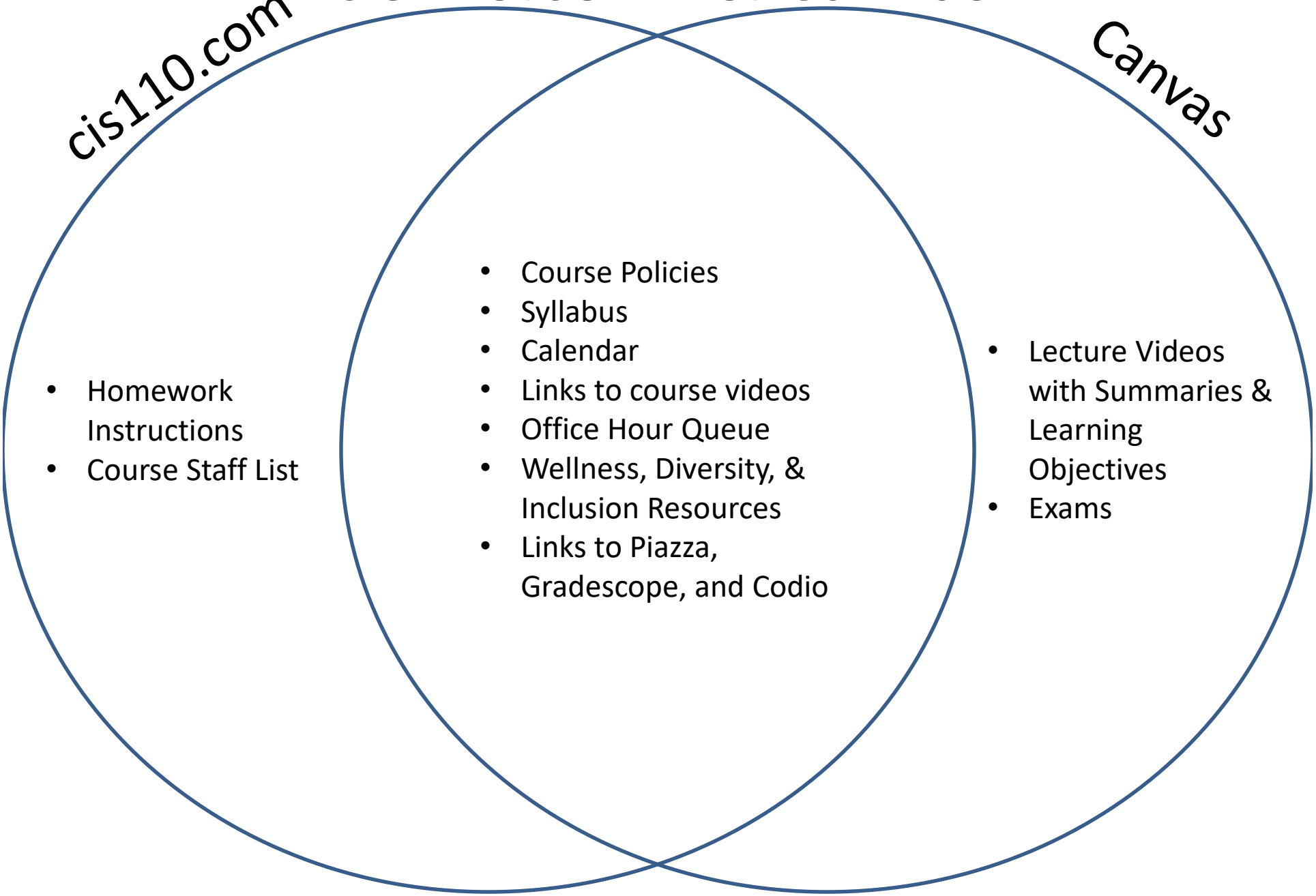
Video Lectures & Live Coding Session recordings hosted here. Access to important policies and links.

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



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**

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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.

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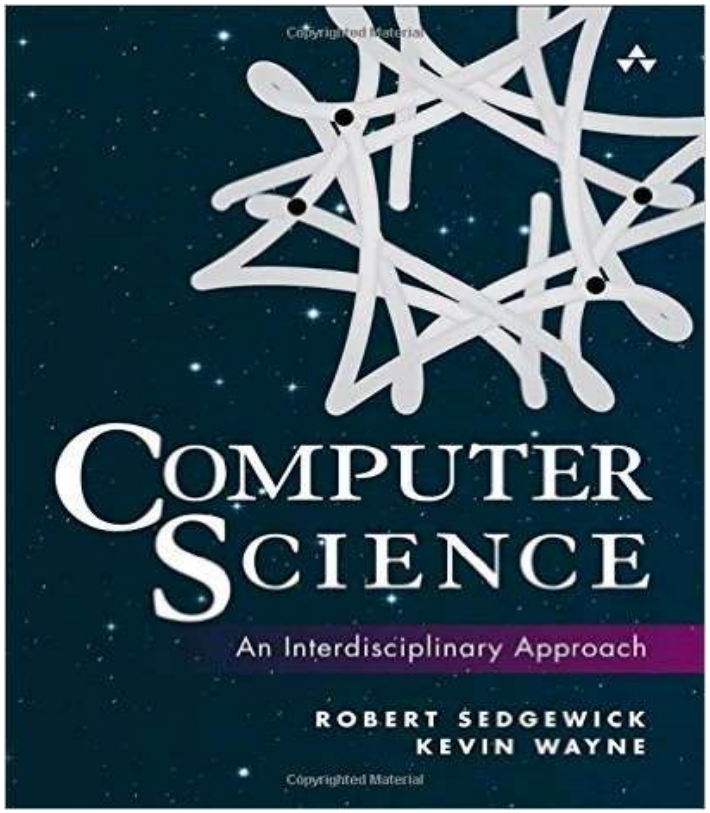
OPTIONAL Textbook



skim before lecture;
read thoroughly afterwards

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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

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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.

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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.

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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!

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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.

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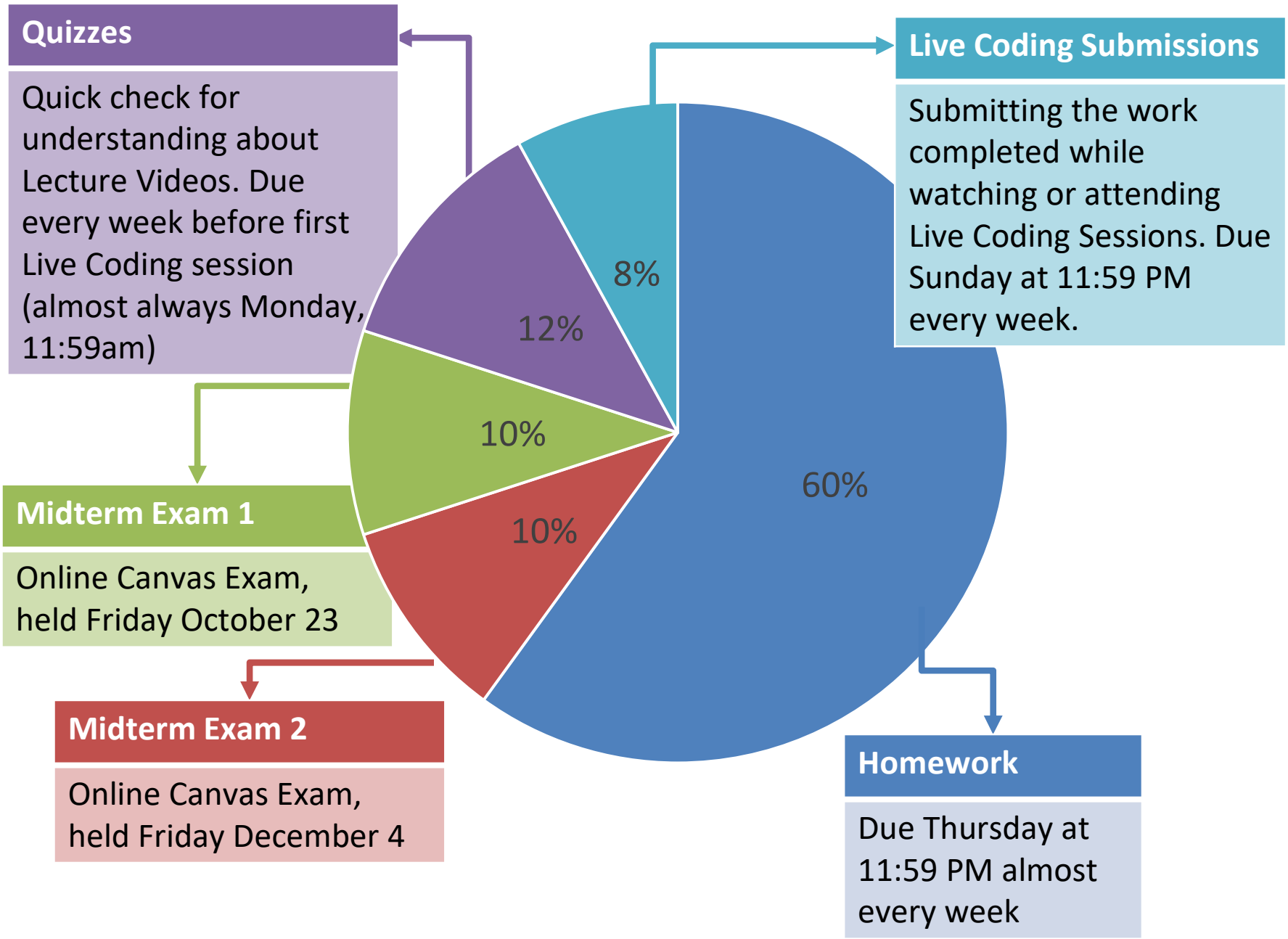
Grade Breakdown



Timing Breakdown

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

	M	T	W	Th	F	Sa	Su
Course Material	Live Coding (12 PM) TA Office Hours	TA Office Hours Eric's Office Hours (10:30 AM-12:30 PM)	Live Coding (11 AM) TA Office Hours	TA Office Hours Next week's Lecture released	Live Coding (12 PM) TA Offi Hours		Sunday Review Session
What's Due	Quiz Due by 12 PM			HW Due by 11:59 PM			Live Coding Submission Due by 11:59 PM

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

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