COMPSCI 101, Fall 2015
Introduction to Computer Science
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http://www.cs.duke.edu/courses/fall15/compsci101
Data into Information and Knowledge

Computer Science

women and men: this is compsci 101
Today this requires computer science

“Our species needs, and deserves, a citizenry with minds wide awake and a basic understanding of how the world works.”

-Carl Sagan
Prerequisites for Compsci 101
Who's taken Compsci 101? (astrachan)
Who has taken CompSci 101? (rodger)
What is Computer Science?

Just ask Siri (or Bing?)

http://www.bing.com/images/search?q=computer+science&go=Submit&qs=n&form=QBRIR&pq=computer+science&sc=8-16&sp=-1&sk=
Anatomy of a search query

https://www.google.com/search?q=what+is+computer+science&espv=2&source=lnms&tbnm=isch&sa=X&ei=Ib77U_O9CtDhSAT07YDABA&sqi=2&ved=0CAcQ_AUoAg&biw=1293&bih=861

What are the parameters to the query?

- What changes, what stays the same?
Questions about Computer Science

What is it that distinguishes it from the separate subjects with which it is related? What is the linking thread which gathers these disparate branches into a single discipline? My answer to these questions is simple --- it is the art of programming a computer. It is the art of designing efficient and elegant methods of getting a computer to solve problems, theoretical or practical, small or large, simple or complex.

C.A.R. (Tony) Hoare
How will you learn to 'speak'?

http://www.rosettastone.com/personal/demo

http://duolingo.com
How will you learn to program?

You learn more than programming
Coding, Algorithms
- UX/UI: User Experience, User Interface
- Data Analytics, Software Engineering

A course, a way of thinking, a set of skills and practice that can lead to more or ...
What language will we learn?

http://www.python.org/

Python is a multi-paradigm language

- Procedural
- Functional
- Object-Oriented

Simple, libraries, widely used

Guido is BDFL
Why is it called Python?

http://www.youtube.com/watch?v=anwy2MP

A

B

C

π

+ 9.8 m/sec²

CompSci 101.2, Fall 2015
Who are you?

Let’s look at survey to see who is taking CompSci 101 in Fall 2015

- Do you recognize yourself?
- Is there a stereotypical CompSci 101 student?
- Is there a stereotypical computer scientist?

Everyone can succeed! Ideally you won’t have lots of experience programming
What is Computer Science?

Artificial Intelligence

Roomba

Spirit, Mars Rover

CMU’s Sandstorm
What is Computer Science?

Medicine, Genomics
What is Computer Science?

Devices
What is Computer Science?

Animation
Daphne Koller, AI Pioneer, Educator

Computers learn to diagnose breast cancer? And more? *The Data Scientist on a Quest to turn Computers into Doctors*

http://wrd.cm/1E9zFqy

On Coursera: "But to practice problem-solving, a student must first master certain concepts. By providing a cost-effective solution for this first step, we can focus precious classroom time on more interactive problem-solving activities that achieve deeper understanding — and foster creativity."

Coursera Founder, NY Times, December 5, 2011
Course overview, logistics


Programming assignments: APTs and Assignments

- Acknowledge assistance, to learn to program ...
- Be aware of late policy

Exams: midterms and final: paper-based, different

- All old midterms available

Class work/attendance

- Examples today, benefits hopefully clear
Course Overview: Is this the right one?

Work by yourself and collaboratively on solving problems that programming

- Analyze the problems, think about solving them
- Create, Collaborate, Persist, Problem-Solve

Why should you come to class?

- Learn things, participate in a community
- Provide help, get help, wonder, dance, think

Why is this course so great?

- Because you're in it
What's in Compsci 101?

Learning about computing, computer science, and programming
- Vocabulary of Python and programming
- Power of automation, repetition, scale
- Understanding and changing the world

Programming using Python
- Tools: Eclipse, EPD, Libraries, ...
- Using mathematical and scientific techniques
- Art and science of programming
Questions

If you gotta ask, you’ll never know
Louis Armstrong: “What’s Jazz?”

If you gotta ask, you ain’t got it
Fats Waller: “What’s rhythm?”

What questions did you ask today?
Arno Penzias
Latanya Sweeney
Chief Technologist at FTC. I am a computer scientist with a long history of weaving technology and policy together to remove stakeholder barriers to technology adoption. My focus is on "computational policy" and I term myself a "computer (cross) policy" scientist. I have enjoyed success at creating technology that weaves with policy to resolve real-world technology-privacy clashes.

http://latanyasweeney.org/
Identify 87% of US population using (dob,zip,gender). Director of Harvard Data Privacy Lab, instrumental in HIPAA because if de-identification work
"Hello World"
Scratch Program
Colors
- Duke blue: motion
- Mustard: control
- Light blue: sensing
- Orange: data
- Purple: looks
What is a Scratch Program?

Python data reading code

```python
f = open("/data/kjv10.txt")
st = f.read()
total = len(st)
zc = st.count('z')
print "total # chars = ", total
print "number of z’s", zc
for ch in 'aeiou':
    print ch, st.count(ch)
```
Explaining Python code?

Duke Connection: Fred Brooks '53

What Would FB Say?
"The most important single decision I ever made was to change the IBM 360 series from a 6-bit byte to an 8-bit byte, thereby enabling the use of lowercase letters. That change propagated everywhere."

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Why is programming fun?   Fred Brooks

First is the sheer joy of making things
Second is the pleasure of making things that are useful
Third is the fascination of fashioning complex puzzle-like objects of interlocking moving parts
Fourth is the joy of always learning
Finally, there is the delight of working in such a tractable medium. The programmer, like the poet, works only slightly removed from pure thought-stuff.