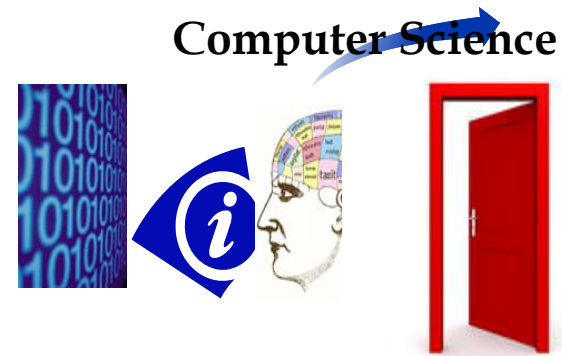


COMPSCI 101, Fall 2015
Introduction to Computer Science
Susan Rodger
Owen Astrachan

<http://www.cs.duke.edu/courses/fall15/compsci101>

Data into Information and Knowledge



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)



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Who has taken CompSci 101? (rodger)



1.7

What is Computer Science?

<http://bit.ly/101fall15-825-1>

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Just ask Siri (or Bing?)

<http://www.bing.com/images/search?q=computer+science&go=Submit&qsn=n&form=QBIR&pq=computer+science&sc=8-16&sp=-1&sk=>



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1.9

Anatomy of a search query

https://www.google.com/search?q=what+is+computer+science&espv=2&source=lnms&tbm=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>



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



Spirit, Mars Rover



Roomba



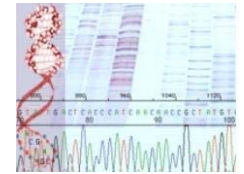
CMU's Sandstorm 1.18

What is Computer Science?

Medicine, Genomics



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1.19

What is Computer Science?

Devices



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1.20

What is Computer Science?

Animation



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1.21

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://bit.ly/koller-cancer>

□ <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

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Course overview, logistics

- For complete details: <http://bit.ly/101fall15>
- 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

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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

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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

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1.25

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

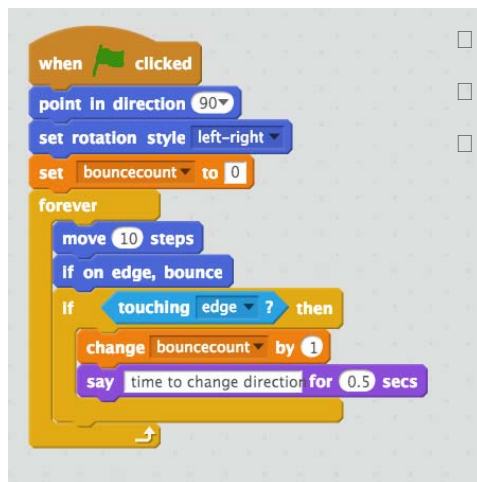
Chief Technologist at FTC. I am a computer scientist with a long history of weaving technology and policy together to remove stakeholder barriers to technology adoption. My focus is on "computational policy" and I term myself a "computer (cross) policy" scientist. I have enjoyed success at creating technology 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 of *de-identification* work

<https://scratch.mit.edu/projects/73232552/>



- "Hello World"
- Scratch Program
- Colors
 - Duke blue: motion
 - Mustard: control
 - Light blue: sensing
 - Orange: data
 - Purple: looks

What is a Scratch Program?

<http://bit.ly/101fall15-825-2>

Python data reading code

```
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)
```

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1.30

Explaining Python code?

<http://bit.ly/101fall15-825-3>

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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."

□ "Fred Brooks" by Copyright owned by SD&M (www.sdm.de) - Request for picture sent by email to Fred Brooks by uploader (Mark Pellegrini; user:Raul654) Fred sent this photo back, along with contact information for Carola Lauber at SD&M, who gave copyright permission.. Licensed under CC BY-SA 3.0 via Wikimedia Commons - https://commons.wikimedia.org/wiki/File:Fred_Brooks.jpg#/media/File:Fred_Brooks.jpg



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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.



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