CompSci 101
Introduction to Computer Science

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Prof. Rodger

www.cs.duke.edu/courses/fall16/compsci101
CompSci 101
Data into Information and Knowledge

Computer Science
Prerequisites for Compsci 101
Who has taken CompSci 101?
What is Computer Science?

Just ask Siri (or Bing?)

http://www.bing.com/images/search?q=computer+science&go=Submit&qs=n&form=QBIR&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&tbm=isch&sa=X&ei=Ib77U_O9CtDhsAT07YDABA&ved=0CAcQ_AUoAg&biw=1293&bih=861

□ What are the parameters to the query?
➢ What changes, what stays the same?
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
Who are all these people?
bit.ly/101f16-0830-2

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3
4
5
6
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“Don’t just play on your phone, program it.”

— President Barack Obama
“Computer science belongs in every public school, right next to biology, chemistry, or algebra.”

— Ashton Kutcher
“I always did something I was a little not ready to do. I think that’s how you grow.”

— Marissa Mayer, CEO, Yahoo!
“In fifteen years we’ll be teaching programming just like reading and writing… and wondering why we didn’t do it sooner.”

— Mark Zuckerberg
“From phones to cars to medicine, technology touches every part of our lives. If you can create technology, you can change the world.”

— Susan Wojcicki, CEO, YouTube
“When you think about the future... I think it’s very important to be able to learn the language of coding and programming.”

— Chris Bosh
Those quotes are all from Code.org
John Hanke,
‘Pokémon Go’
How do you keep your sanity?
Sea turtles hatching

- [https://www.youtube.com/watch?v=sZYd0-egqbc](https://www.youtube.com/watch?v=sZYd0-egqbc)
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
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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?

A

B

C

\[ \pi + \text{clothes} - 9.8 \text{ m/sec}^2 \]
Who are you?

• Let’s look at survey to see who is taking Compsci 101 in Fall 2016
  – 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
Computers learn to diagnose breast cancer? And more? *The Data Scientist on a Quest to turn Computers into Doctors*

• [http://wrd.cm/1E9zFqy](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

www.cs.duke.edu/courses/fall16/compsci101

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

Python code

hello.py

```python
'''
Created on Jan 14, 2016

@author: Susan
'''

print "hello CompSci 101 students"
```
Python data reading code

```python
f = open("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)
```
Announcements

- See assigned reading on course web page
  - Reading Quiz 1 (RQ1) online on Sakai (out today)
  - due by 10am Thurs, Sept 1.
- Labs start this week! (Wed/Thur)
- Assignment 1 out – Due Sept 6
- Install course software
  - Try to install before going to lab
  - If you get frustrated, get help!

- Today: Introduce Computer Science
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
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.