CompSci 101
Introduction to Computer Science

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

August 30, 2016
Prof. Rodger

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
“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
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

https://www.youtube.com/watch?v=sZYd0-egqbc
How will you learn to 'speak'?

- [http://www.rosettastone.com/personal/demo](http://www.rosettastone.com/personal/demo)
- [http://duolingo.com](http://duolingo.com)

- [Compsci 101 Fall 2016](#)

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/](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?

- [Compsci 101 Fall 2016](#)
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

---

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](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](http://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

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

Analyze this Scratch Program?

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

**Python code**

**hello.py**

```python
Created on Jan 14, 2016

@author: Susan

```  

```python
...  

print "hello CompSci 101 students"
```

*compsci 101 fall 2016*  

---

**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)
```

*compsci 101 fall 2016*  

---

**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 Pellegrino; user: Rachel044); Fred sent this photo back, along with contact information for Coralia Lember at SD&M, who gave copyright permission. - Licensed under CC BY-SA 3.0 via Wikimedia Commons.*

---

*Image of Fred Brooks*
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.