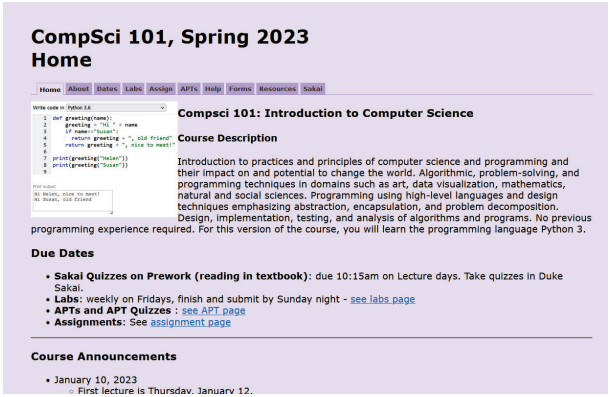
CompSci 101
Introduction



Susan Rodger

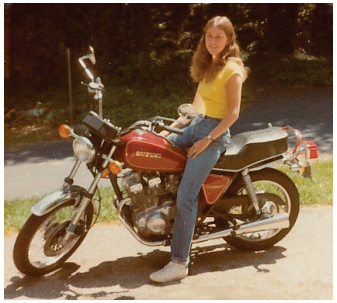
January 12, 2023

Every lecture:
DO NOT SIT IN THE LAST 5 FULL ROWS

or the small 2 seater row at the top!

About Prof Rodger

A long time ago, back in 1979….

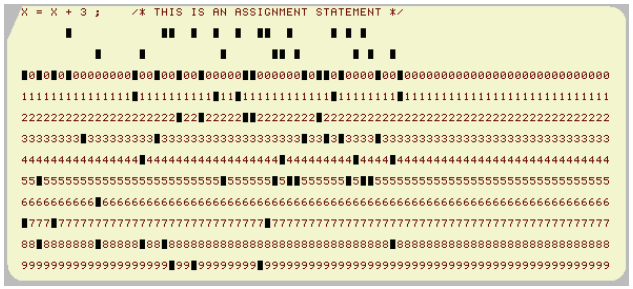


NC State

B.S. Computer Science and Mathematics

- **My first semester, my first course in programming - PL/I**

```
Hello2: proc options(main);
     put list ('Hello, world!');
end Hello2;
```



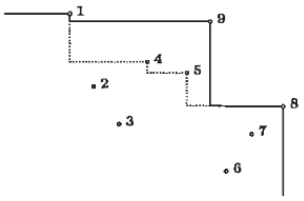
Decisions? Industry? Grad School?

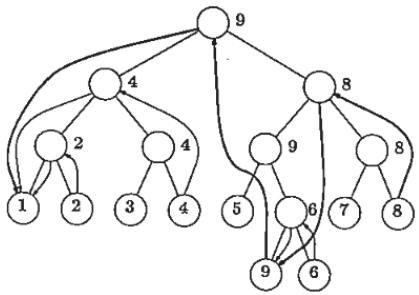
- **Systems Programmer**
  - NCSU,
    University Systems Control Center
- **Undergraduate Research**
  - Cleanup data from buoys in the water
  - Last minute decision
    - IBM Summer job
    - Go to Grad School

PURDUE UNIVERSITY

PURDUE BOILERMAKERS

- **MS. 1985, P.h.D 1989**
- **New Data Structure**
  Dynamic contour search tree





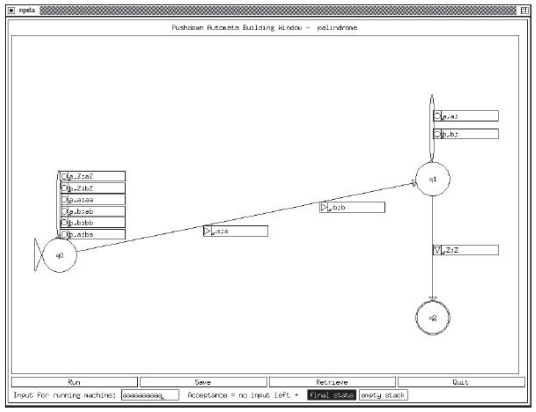
Rensselaer

Assistant Professor

- **Continued research in algorithms**
- **CAREER CHANGE….**
- **Got more interested in education**

Started developing education tools Changed area to Visualization Tools and CS Education

- **Tool – NPDA - to experiment with pushdown automata**

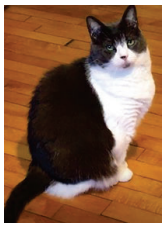


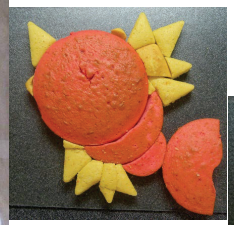
1994 – Moved to Duke University Professor of the Practice

- **Position focuses on Education in the Discipline**
- **Focused on designing educational software**
  - JFLAP – tool for experimenting with theoretical CS concepts

JFLAP

How I Keep my Sanity





How do you keep your sanity?

Prof. Yesenia Velasco

- Handles logistics, substitute lectures, and much more!
- Will teach some lectures, teaching this course next semester
- Handles accommodations
  - Email her your accommodation letter
  - yvelasco@cs.duke.edu

Learn the CS Alphabet

A is for …

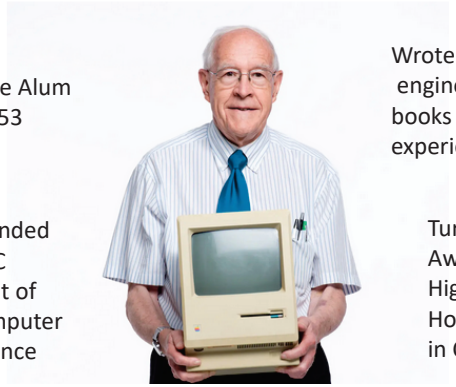
- **Algorithm**
  - Step-by-step instructions realized in a program
- **Abstraction**
  - Hiding things is powerful
  - "What" vs "How"
- **APT**
  - Algorithmic Problem-solving Testing
- **API**
  - Application Programming Interface - using Libraries

Feature someone related to CS in every lecture

The New York Times

Frederick P. Brooks Jr., Computer Design Innovator, Dies at 91

He was a lead designer of the computers that cemented IBM's dominance for decades. He later wrote a book on software engineering that became a quirky classic.

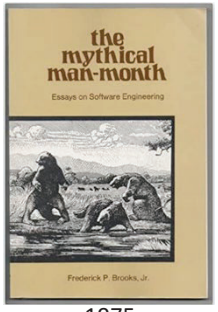


Duke Alum
BS '53

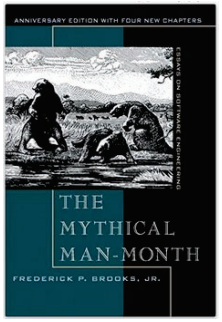
Founded
UNC
Dept of
Computer
Science

Wrote Software engineering books on his experience

Turing Award – Highest Honor in CS



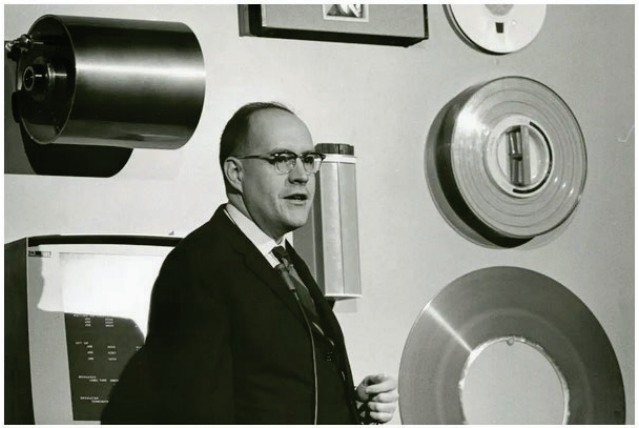
1975



1995

Brooks – Technical Leader of IBM's 360 computer project

- **1964 – 360 was a family of six compatible computers**



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."

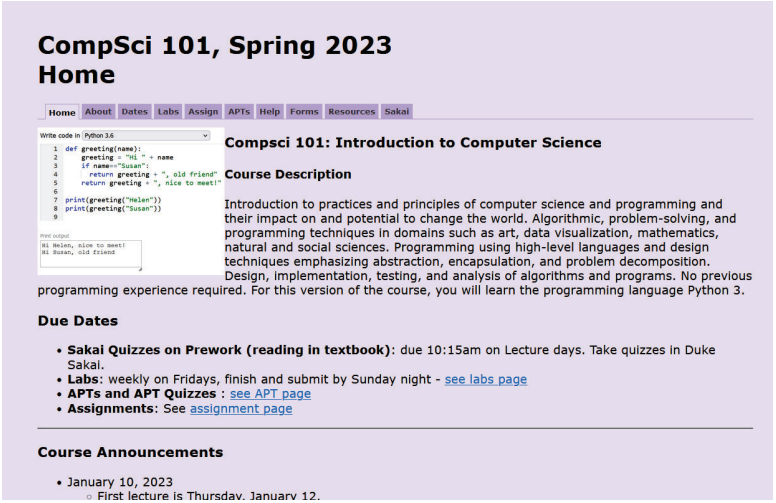
- "Fred Brooks" by Copyright owned by SD&M (www.sdm.de) - Request for picture sent by email to Fred Brooks by uploader (Mark Pellegrini; user:Raul654) Fred sent this photo back, along with contact information for Carola Lauber at SD&M, who gave copyright permission.. Licensed under CC BY-SA 3.0 via Wikimedia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

Why is programming fun?

Fred Brooks

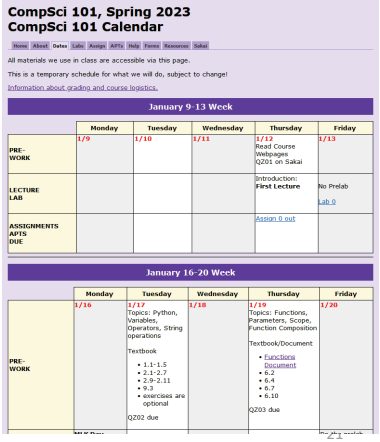
- **First is the sheer joy of making things**
- **Second is the pleasure of making things that are useful**
- **Third is the fascination of fashioning complex puzzle-like objects of interlocking moving parts**
- **Fourth is the joy of always learning**
- **Finally, there is the delight of working in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

Go over CompSci 101 webpages



Announcements

- **Check out the calendar on the course website**
  - PRE-WORK – what you must do before the lecture
  - LECT/LAB – will put notes/videos here from the live lecture or for the lab
  - DUE – what is due each week.
  - What has been updated?
- **Assignment 0 is already out!**
- **Lab 0 on Friday**
- **Prelab for Lab1 (install Python)**
- **You will see a link to this video!**



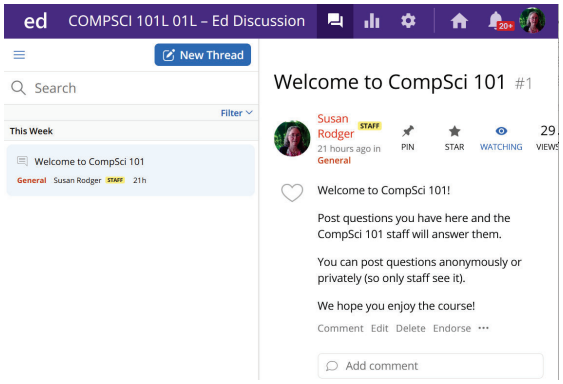
Course overview, logistics

www.cs.duke.edu/courses/spring23/compsci101

- **Programming assignments: APTs and Assignments**
  - Acknowledge assistance, to learn to program …
  - Be aware of late policy
- **Labs**
  - Attend each Friday
- **Lecture - Classwork**
  - Attend the live lecture - participate
  - If you can't attend you must watch it and participate within 24 hours
- **Exams: 3 exams and final**
  - All old exams available

Questions?

- **Don't send us email!!!!!!!!!!!**
- **Post your questions on Ed Discussion**
  - We will answer them there!
  - You should try to answer them too
    - Want to be a UTA one day? Answer questions!
- **Post Questions during lecture!**



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: PyCharm, Libraries, …
  - Using mathematical and scientific techniques
  - Art *and* science of programming

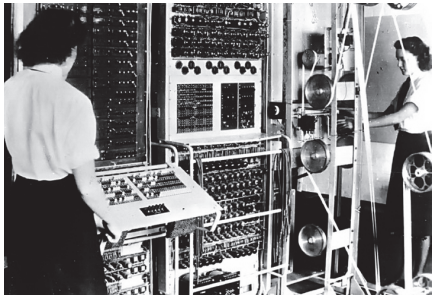
WOTO – Working Together

http://bit.ly/101s23-0112-1

Discuss with others, then everyone fills out their own form.

What is Computer Science?

How it started How it's going



Computers speak in 0's and 1's

1906

- **In old computers**
  - Control electric current using the vacuum
- **Nowadays, use switches**
  - A switch that is "on" or "closed" represents 1
    - Passes electrical current through
  - A switch that is "off" or "open" represents 0
    - Blocks electrical current
  - Express 0's and 1's, called bits
  - 8 bits are a byte and represent a symbol
- **What letter is 01000001 ?**

Computers speak in 0's and 1's

1906

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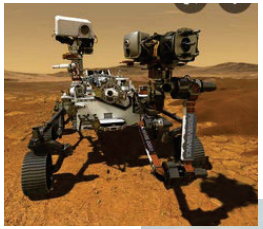
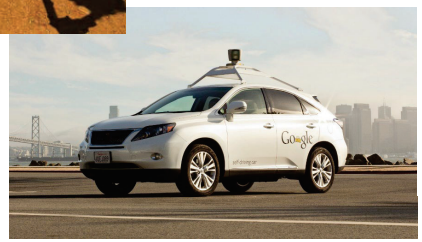
  - A switch that is "off" or "open" represents 0
    - Blocks electrical current
  - Express 0's and 1's, called bits
  - 8 bits are a byte and represent a symbol
- **What letter is 01000001 ?** A

What is Computer Science now?

- **Artificial Intelligence**



Perseverence Mars Rover



Self-driving car

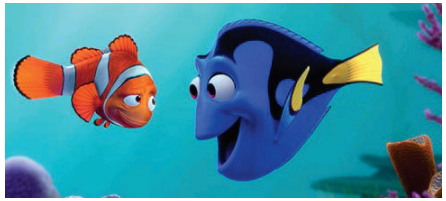
Personal Robot

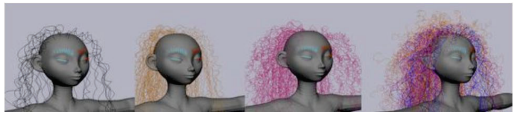
What is Computer Science?

- **Medicine, Genomics**

What is Computer Science?

- **Animation**





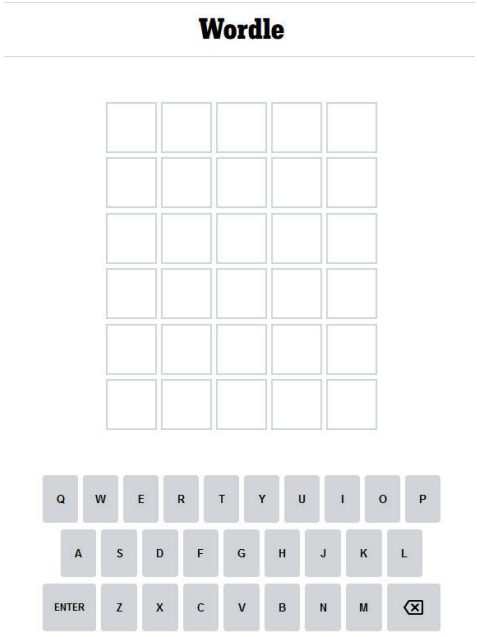
What is Computer Science?

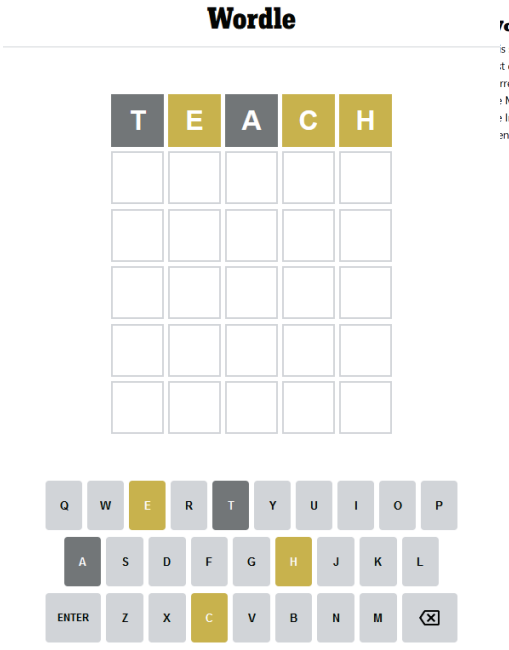
- **The Organization of Data, Sharing, and Searching**

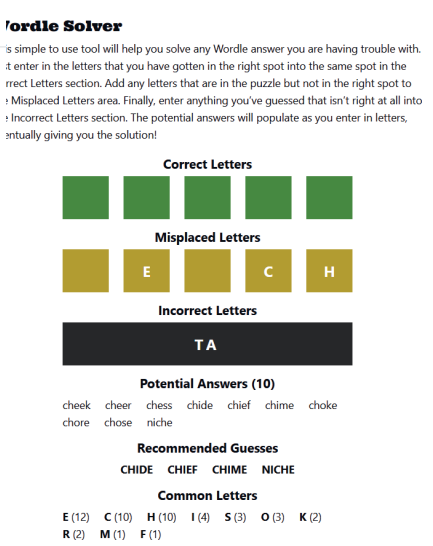
Prerequisites for Compsci 101

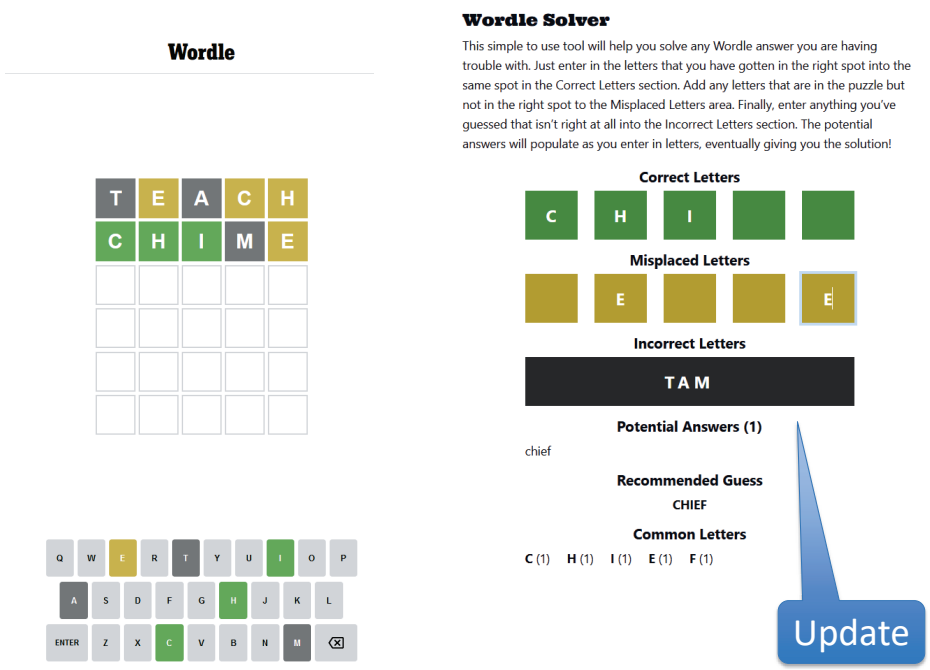
After taking this course you will be able to ….

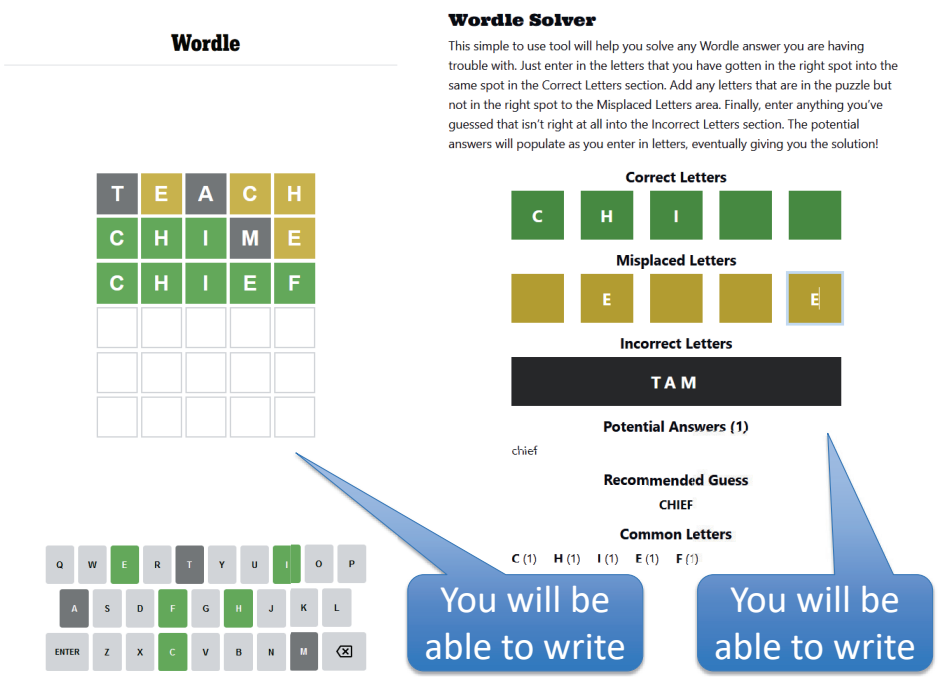
- **Write a program for Wordle**
- **Write a word finder to help someone solve Wordle**











Who has taken CompSci 101?

Who are you?

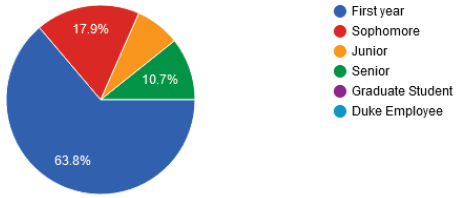
- **Let's look at survey to see who is taking Compsci 101 in Spring 2023**
  - Do you recognize yourself?
  - Is there a stereotypical Compsci 101 student?
  - Is there a stereotypical computer scientist?

- **Everyone can succeed! Ideally you won't have lots of experience programming**

From Survey

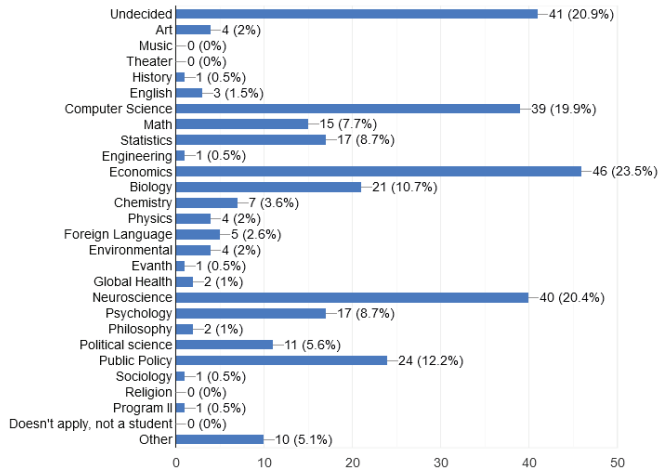
What year are you?

196 responses



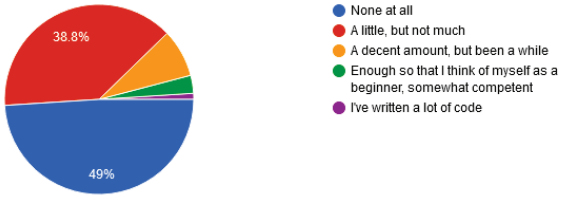
What's a possible or likely major?

196 responses



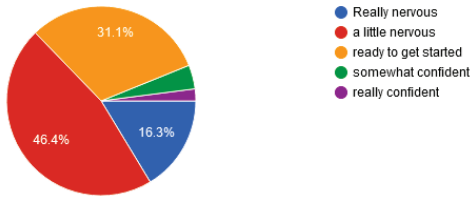
How much programming have you done before?

196 responses

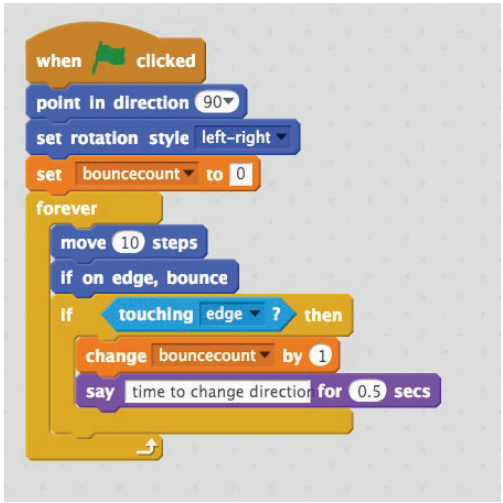


How do you feel about taking CompSci 101?

196 responses



What does this program do?



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

WOTO: WOrking TOgether

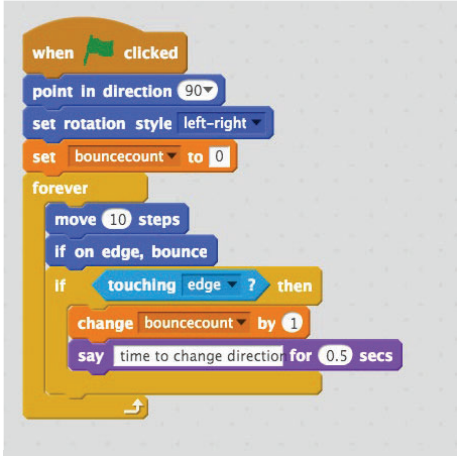
http://bit.ly/101s23-0112-2

Analyze this
Scratch Program?

WOTO: WOrking TOgether

http://bit.ly/101s23-0112-2

Analyze this
Scratch Program?



Scratch Program

- **If you want to experiment with this scratch program, here is the link:**

https://scratch.mit.edu/projects/94064630/

You don't have to understand this yet!!

What language will we learn?

- http://www.python.org/
- Python is a *multi-paradigm* language
  - Procedural
  - Functional
  - Object-Oriented
- Simple, libraries, widely used
- Guido von Rossom

Why is it called Python?

A

B

Why is it called Python?

A

B

Python code hello.py

```
1  """
2  Created on 1/6/2022
3
4  @author: Susan H. Rodger
5  """
6
7  if __name__ == '__main__':
8      print("Hello CompSci 101!")
```

OUTPUT:

Python code hello.py

```
1  """
2  Created on 1/6/2022
3
4  @author: Susan H. Rodger
5  """
6
7  if __name__ == '__main__':
8      print("Hello CompSci 101!")
```

You don't have to understand this yet!!

OUTPUT:

```
C:\Users\Susan\AppData\Local\Progr
Hello CompSci 101!

Process finished with exit code 0
```

Python Code, second program

```
6   def greeting(name):
7       print("Hello " + name)
8
9   if __name__ == '__main__':
10      greeting("CompSci 101!")
11      greeting("Beenie, Keeah and Moe")
```

OUTPUT:

Python Code, second program

```
6   def greeting(name):
7       print("Hello " + name)
8
9   if __name__ == '__main__':
10      greeting("CompSci 101!")
11      greeting("Beenie, Keeah and Moe")
```

You don't have to understand this yet!!

OUTPUT:

```
C:\Users\Susan\AppData\Local\P
Hello CompSci 101
Hello Beenie, Keeah and Moe
```