

Computer Science 141

Prof. Hong Xu



What is this course about?

An introduction to the fundamental concepts and practices of procedural programming. Topics include data types, control structures, functions, arrays, files, and the mechanics of running, testing, and debugging. Emphasis is placed on program design and problem solving techniques. The course also includes an introduction to the historical and social context of computing and an overview of computer science as a discipline.

```
def key_press(self, symbol, modifiers):
    """Delegate key press"""
    self.context_index == -1:
    if symbol == key.UP and not self.active_index == 0:
        self.menu_labels[self.active_index].color = [255, 255, 255]
        self.active_index -= 1
        self.mags_dt = self.get_act_color_mag()
    elif symbol == key.DOWN and not self.active_index == 3:
        self.menu_labels[self.active_index].color = [255, 255, 255]
        self.active_index += 1
        self.mags_dt = self.get_act_color_mag()
    elif symbol == key.ENTER:
        if self.active_index == 3:
            pygame.app.exit()
        else:
            self.context_index = self.active_index
    elif symbol == key.ESCAPE:
        if self.context_index == -1:
            pygame.app.exit()
        else:
            self.context_index = -1
    if self.context_index == 1:
        if symbol == key.ESCAPE:
            self.context_index = -1
        else:
            self.cur_game.on_key_press(symbol, modifiers)
    else:
        if symbol == key.ESCAPE:
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```



What is computer science?



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-- Wikipedia



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“Computer science is no more about computers than astronomy is about telescopes.”

-- attributed to Edsger Dijkstra



What is this specific CS course about?

TL;DR: Programming!

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Why Programming?

- Programming forms the basics of how we express to computing devices what we want done and a major part of how we solve problems with compute.
- Learn how to program very well to have a good time at work and unlock solving increasingly hard problems.

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What problems has Computer Science solved? What problems should we solve next?

Can you think of anything?



What problems has Computer Science solved? What problems should we solve next?

Can you think of anything?

Would you say we've found perfect solutions to the problems or can we do better?



The Basic Idea of Programming: Instructions



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Algorithm: A step-by-step procedure for accomplishing a specific task.

Programming is how we give these procedures to the computer in ways it understands it.



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It is like writing an instruction manual. You want to be very precise, so the computer does exactly what you want it to do!



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Abstraction: "The essence of abstractions is preserving information that is relevant in a given context, and forgetting information that is irrelevant in that context."



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When writing instructions, you won't be teaching the physics of what is happening or explaining the purpose of every action. You omit information that is not relevant to make communication efficient. This is what abstraction aims to achieve.



Why Study CS?

- Most code can be written with LLMs. Just like a lot of the coursework.
- But understanding what it is doing is essential! Will give you an edge in the future.



Why Study CS?

- Contribute to society
 - Combine with biology, chemistry, physics, math, business, economics, music, art...
 - Work in transportation, medicine, engineering, economics, entertainment, technical theater, record keeping, insurance...
 - An opportunity to be part of the future in nearly any field nowadays



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 - An opportunity to be part of the future in nearly any field nowadays
- It's fun!



Why CS at Rhodes?

- Liberal arts background is great!
 - Communication skills (verbal & written)
 - Strong work ethic
 - Teamwork skills (works well with others)
 - Initiative
 - Interpersonal skills (relates well to others)
 - Problem-solving skills



Data Analytics!

- We have tons of data, and we need ways to understand it. Let's use CS, Math, econ, and whatever else we need to extract the useful info from our data.
- We have a new major, Data Analytics, which teaches you how to analyze data you care about, and make this into a marketable skill.
- Employers love data scientists with domain knowledge!



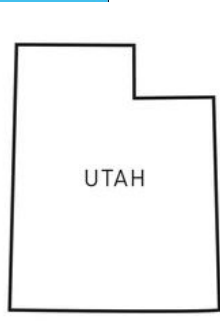
Syllabus

- Prerequisites: None!
- Coursework: projects, labs, midterms, final etc.
- Workload: 2-3 hours outside of class per hour in class. Do not leave assignments to the last minute.
- Office hours and tutoring
- AI Policy: Please don't use AI. You'll get a 0 or an honor code violation.
 - If you are found in violation of the honor code for any portion of the class, your grade will be F for the whole class.

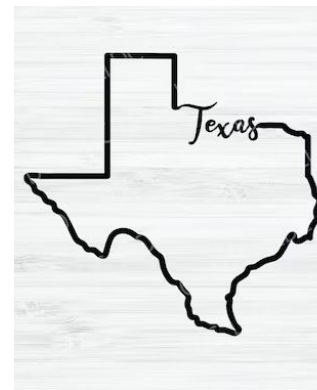


Class conduct

- Be on time.
- Raise your hand to ask a question.
 - Corollary: Raise your hand a lot!
- Please raise your hand to be excused.



Rhodes College





Introductions

1. Preferred Name (optional: pronouns)
2. Freshman(first-year)/sophomore/junior/senior
3. What did you do this summer?
4. Favorite dessert?
5. Any tech from sci fi or magic from fantasy you wish existed in real life?
6. Other things you'd like to share (where you're from, how many grapes you can fit in your mouth, etc.).



First day survey

Show canvas



Let's chat

- Your first lab grade consists of coming to my office hours or schedule a time to meet in my office any time during the first two weeks of class.
- Just stop by for 3-5 mins and chat about anything.



The Basic Idea of Programming: Instructions

Algorithm

Specific and detailed instructions or recipe.

Abstraction

Include only what's necessary.



Write an algorithm that tells me how to draw a smiley face on the white board.

Assume I will follow your instructions literally and know nothing that you haven't specified.

Let's Jump In to Programming

Prof. Hong Xu





Our first programming language: Python

```
first_tiny_script.py — ~/Documents/python/automate
first_tiny_script.py
1  # This program says hello and asks for my name
2
3  print('Hello world!')
4  print('What is your name?') # ask for their name
5  myName = input()
6  print('It is good to meet you, ' + myName)
7  print('The length of your name is:')
8  print(len(myName))
9  print('What is your age?') # ask for their age
10 myAge = input()
11 print('You will be ' + str(int(myAge) + 1) + ' in a year.')
12
```



Open Your Python Notebook

Instructions:

- Click to wake machines up.
- Type in your username (no @rhodes.edu, e.g. xuho-30)
- Open your Browser
- Go to rhodes-notebook.org
- Log in again with your username, password, and two-factor authentication
- Go to `cs141-fa26`, and then `xu/`.
- Open the notebook for Day01



Think about your sci-fi dreams, the major problems the world faces, and what the future looks like.

Can we get there without computers?