Computer Science Principles

REVIEW

Announcements

Final Exam on Thursday, **June 17** at **3:15 – 5:45 pm**

Final Exam:

- Mainly focused on material from the second half of semester
- However, will have some material from the first half of the semester
- Combination of text response, multiple choice questions, and programming problems
  - Around similar level of content as ~2 quizzes
- Open book / open notes – same as quizzes
- Video camera **must** be on to receive credit
  - You must be in the video – pointing your video at the ceiling will not count
  - If you do not have a web camera, you can login to Zoom with your phone

Our Major Topics: From Lecture 1

Computational thinking and problem solving

Fundamentals of programming in the Python language

Boolean logic

Basic algorithms for searching and sorting

Data representation and compression

Social, legal and ethical issues in computing

Additional topics may be covered and this list may be modified based on interest and time

Python

Commands and expressions

Arithmetic

Variables

Assignments

Keyboard input

Console output

Functions (a form of abstraction)
- Void vs. fruitful functions
- Optional arguments

Function composition and helper functions

Flow of execution

Conditionals and Boolean expressions

Python

Relational operators

Strings
- String functions
- String methods
- Slicing and splitting stings

Devising algorithms
- Sieve algorithm for prime numbers

Collections (containers)

Lists
- Slicing

Iteration (loops)
- For and while loops
- Nested loops

Searching and sorting

Search
- Linear search
- Binary search

Sorting
- Insertion sort
- Selection sort
- Merge sort
- Quick sort

Random numbers

Algorithm complexity
- Big-O notation
- Big-O families: $\log_2 n$, n, $n\log_2 n$, n^2

More algorithms, data structures

Recursion

Machine learning

- Spam filtering

String manipulations

File I/O

Dictionaries

Tuples

More algorithms, data structures

List comprehensions

Dictionary comprehensions

Classes and objects

Exceptions and exception handling

Data representations
- Analog vs. digital

Binary and hexadecimal numbers

Characters
- ASCII
- Unicode

Text compression
- Lossy vs. lossless
- Huffman coding

Privacy

Online privacy

Natural language Processing

The Turing Test

Artificial Intelligence

ELIZA

- Patterns
- Pattern matching
- Regular expressions

What you have learned. . .

Yes, we've done all that!!!

- You learned a lot about CS in this overview course on Computer Science Principles

We used Python as a tool to learn CS concepts and programming

- You might learn a new language, but the fundamentals will be the same

If you are majoring in CS, this is be a good starting point and you will be ready for the next step:

- CSE 114 Introduction to Object-Oriented Programming
- CSE 215 Foundations of CS (if you want to try 2 courses next semester)

If you are not a CS major, this is still a good exposure to CS and programming

These skills can be helpful for many different jobs

- Researcher, data scientist, project manager, engineer, etc.

Suggestion

If you are planning on taking CSE 114 next semester or in the future . . .

Review this course material during the break

- Start with the first lecture and go through them all in order
- As you read the lecture notes, do each lab exercise followed by the problem sets, without looking at the solution
- Doing it the second time will be much easier and you will learn a lot! It will be much faster as well.

If you need help as you review, let me know

If interested, read the two textbooks in detail during the break

Finally . . .

I had lots of fun teaching the course!

I hope you had fun, too.

I know this course was a lot of work and very difficult for many of you

- However, this is only the beginning of studying computer science and it takes a lot of effort
- It can be particularly difficult at the start, and it is very impressive for you all to have made it this far!

Good luck with your finals and have a great break!

- Hope to see you next semester on campus