Welcome to CS 134
Introduction to Computer Science

What is Computer Science

"[Computer science] is not really about computers -- and it's not about computers in the same sense that physics is not really about particle accelerators, and biology is not about microscopes and Petri dishes…" — Hal Abelson

"The topic became – primarily in the USA – prematurely known as 'computer science' – which, actually, is like referring to surgery as 'knife science' – and it was firmly implanted in people's minds that computing science is about machines and their peripheral equipment."   — Edsger Dijkstra

What is Computer Science?

- It is about imperative ("how to") knowledge, as opposed to declarative ("what is") knowledge

- Imperative knowledge is expressed via algorithms

    - Algorithms: computational recipes

    - Sequence of simple steps

    - Flow of control that specifies when each step is executed

- A computer can performs billion of operations per secondd and can remembers 100s of gigs of information

- But computers can only know what you tell them and can only do whatever is specified

- We tell a computer what steps to take exactly and how to implement algorithms through a computer program

Who We Are

Shikha Singh
Co-instructor
shikha@cs.williams.edu
TBL 309B

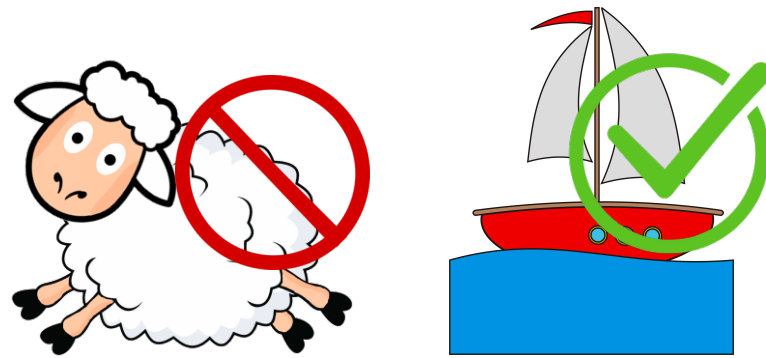Iris Howley
Co-instructor
iris@cs.williams.edu
TCL 308

Lida Doret
Lab Instructor
lpd2@williams.edu
TCL 205

More About Me (Shikha)

Pronunciation: "Shi" is like in ship not sheep

- Pronouns: She/Her/Hers

- Office: **TBL 309B** (New "CS annex" area)

- CS134 Student help hours:

  - Mon 2.30-4 pm @ my office or common room near it

  - Wed noon-2 pm @ CS common room

CS134 TA Team!

Harun Curak

Diego Esparza

Nathan Thimothe

Maria Chapman

Amelia Chen

Caleb Dittmar

Hugo Hua

Brian Kamau

Sarah Lyell

Yash Mangal

Rachel Nguyen

Minh Phan

Mira Sneirson

Jules Walzer-Goldfeld

Emma Wuerth

CS134: Course Website

- https://www.cs.williams.edu/~cs134/
- One stop shop for: Office hours, TA Hours. the textbook, lecture slides, homeworks, labs, etc!

CSCI 134 - Spring 2020
Introduction to Computer Science

Home | Shikha's Lectures | Iris's Lectures | Labs & Homeworks | Resources | CS@Williams

Home

Section:	CSCI 134-02, 134-08, 134-09
Instructor:	Shikha Singh
Email:	shikha@cs.williams.edu
Phone:	x4773
Office:	TBL 309B
Office Hours:	Mondays: 2:30-4 pm; Wednesdays: 12-2:00 pm & by appointment
Lectures:	MWF: 9:00-9:50 am, Schow Science Library 030a
Labs:	Tuesday 1-2:30 pm (Section 08) & 2:30-4:00 pm (Section 09) in TCL 217a
	Labs are due Thursday @ 11 pm

Section:	CSCI 134-03, 136-04, 136-05

Fast Paced Course

- How to succeed:

  - Do readings before class

  - Read and think about labs as soon as they are released

  - Seek help! Use resources!

- Learning to program is all about **PRACTICE, PRACTICE, PRACTICE!**

  - Just like learning a musical instrument, learning to ski, or building muscle, it requires repetition and dedication

  - Can't passively absorb material

  - **Don't be afraid to fail and make mistakes**—in fact you are encouraged to do so!

  - No one learns anything without making mistakes and learning why and how to fix them

Topics/ Concepts

- Abstraction and modularity

- Representing knowledge with data structures

- Iteration and recursion as computational tools

- Divide and conquer problem solving strategies

- Iterative and incremental programming

- Testing and debugging

- Organizing and dealing with data

- Plotting and visualizing data
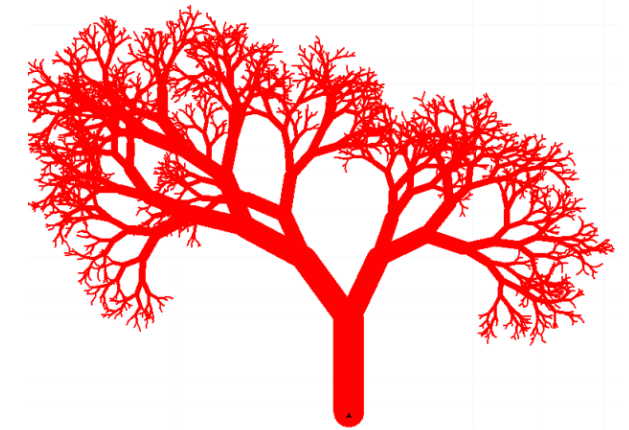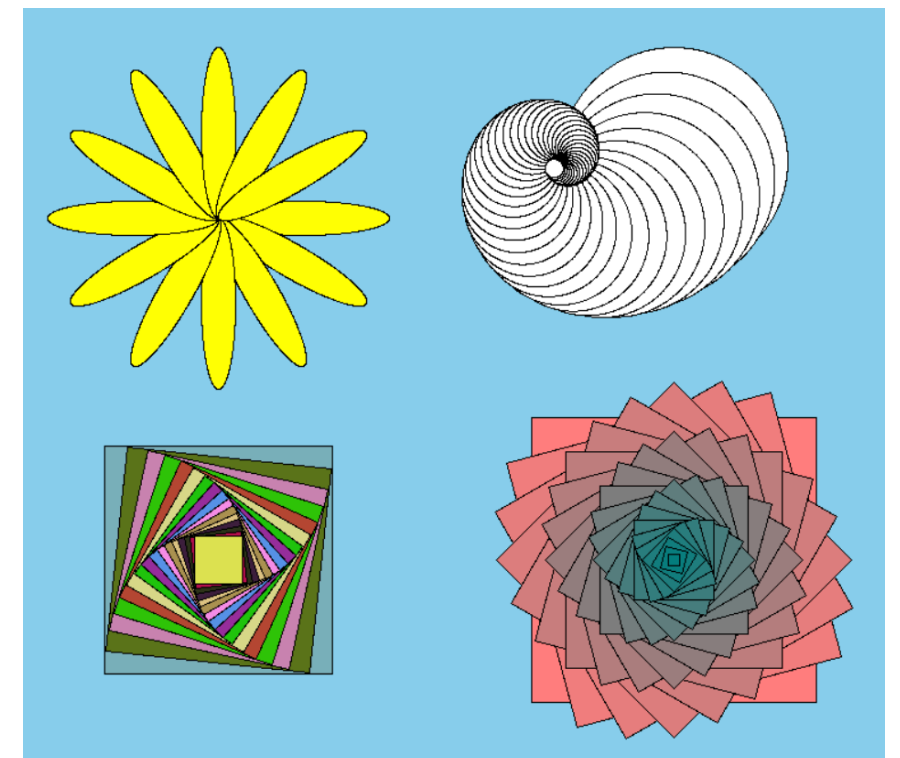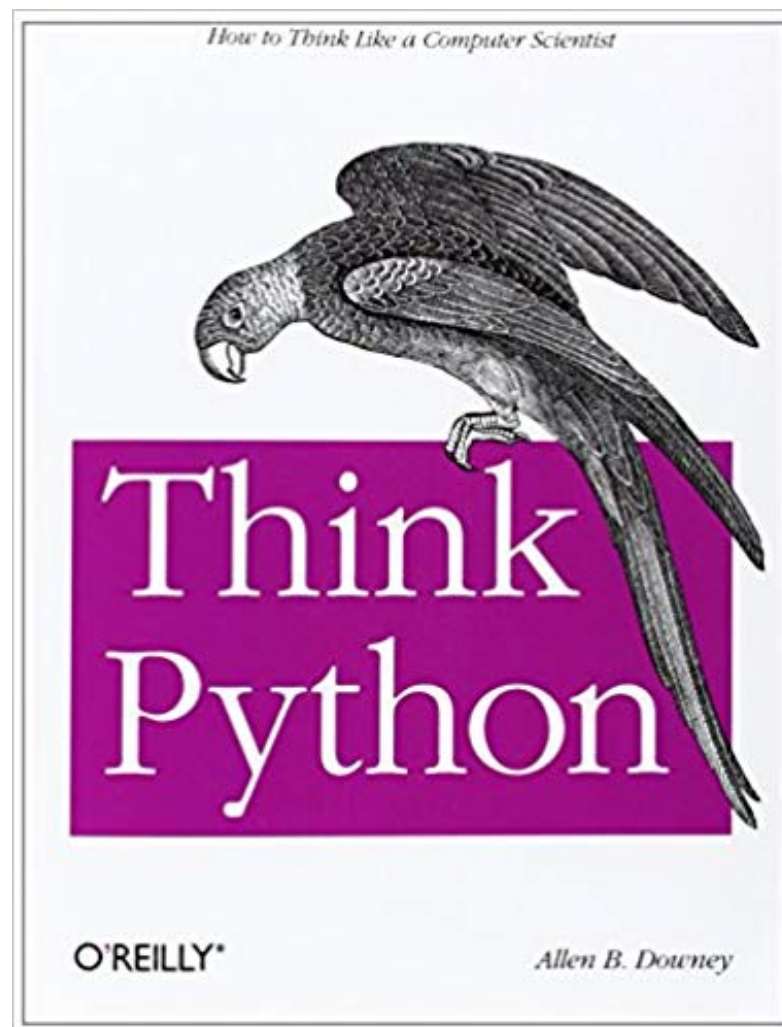
- Playing with python graphics

Image Source: (http://cs111.wellesley.edu/spring19)

Textbook

- Think Python: How to think like a computer scientist by Downey: http://greenteapress.com/wp/think-python-2e/

- We use this textbook the first half of the course

- Chapters are assigned on the course schedule/syllabus

Syllabus/Schedule

- Available on the course webpage

Tentative Schedule of Topics

Week of	Monday	Lab	Wednesday	Friday
Feb. 3	—		—	1. Hello, world! (TP1)
Feb. 10	2. Expressions (TP2)	I. Python and Gitlab	3. Functions (TP3)	*Winter Carnival*
Feb. 17	4. Conditions (TP5-6)	II. Procedure	5. Iteration (TP7)	6. Lists & Mutability
Feb. 24	7. Strings (TP8-9)	III. Toolbox Building	8. Lists, Tuples (TP10,12)	9. Files (TP14)
Mar. 2	10. Sets, Dicts, (TP11)	IV. Faculty Trivia	11. Interpretation	12. Generators
Mar. 9	13. Iterators	V. Presenting Data	14. Classes (TP15-17)	Classes & n-grams
Mar. 16	16. Special Methods	VI. Generators	17. Operators	18. *Slack*
M. 22&29	*Spring Break*	*Spring Break*	*Spring Break*	*Spring Break*
Apr. 6	19. Images	VII. Images	20. *Slack*	21. Multiple Classes
Apr. 13	22. Recursion	VII. Multiple Classes	23. Graphical Recursion	24. Linked List I
Apr. 20	25. Linked List II.	VIII. Recursion	26. Binary Trees	27. Tree Maps
Apr. 27	* *Slack*	IX. Recursive Trees	28. Object Persistence	29. Scope
May 4	30. Iterative Sorting	X. Project	31. Recursive Sorting	32. Search
May 11	33. *Special Topics*	X. Project (cont.)	34. *Special Topics*	35. Evaluations

Midterm

Final

Grading Breakdown

- **Homeworks (15%)**

    - Short answer programming & problem solving questions

    - Due Mondays in class

    - Use pencil and paper Labs

- **Labs (35%)**

    - Meet Mon/Tues for a 1.5 hour block

    - Monday labs → Wed @ 11pm | Tuesday labs → Thurs @ 11 pm

    - Review lab as soon as it comes out (~Fridays)

- **Midterm (25%)**

    - Evening exam on **Thursday, March 12.**

- **Final (25%)**

    - Scheduled Final Exam

- **Participation +/- 5%**

About Class Participation

- **I like interaction in my classes!**

- Many ways to participate:

  - Ask questions! (there are no bad questions in my class)

  - Answer questions (there are no wrong answers in my class)

  - Laugh at my jokes (no guarantees here)

  - Talk to me after class/office hours

- Class participation does not mean dominating classroom discussions or interrupting your peers

> **Bottom line.** *Help create a vibrant, positive and inclusive classroom environment!*

Course Support

- Tons of resources, use them!

  - Around fifteen TAs assigned, TA hours TBD

  - Iris, Lida and I also hold *office* hours

    - Iris: Wed 12-1 pm, Thurs 10-noon.

    - Shikha: Mon 2.30-4 pm, Wed 12-noon @ CS common room

    - Lida: Wed 1.30-3 pm

- Where to find all the hours? Calendar on the course webpage.

Course Support Schedule (TAs and office hours)

CS134-Spring20

Today ◀ ▶ February 2020 ▾   🖶Print Week **Month** Agenda ▾

Sun	Mon	Tue	Wed	Thu	Fri	Sat
26	27	28	29	30	31	Feb 1
2	3	4	5	6	7	8
9	10	11	12	13	14	15

2:30pm Shikha's offic (Mon 10)
12pm Shikha's office, 12pm Iris Office Hou (Wed 12)
10am Iris Office Hou (Thu 13)

Intro Programming and Beginner Skiing

- Everyone starts at a different place with varying level of familiarities with the same or related activities

  - Maybe you have ice-skated or programmed a little Java in high school

- Different people pick it up at different paces

  - Some people just have really good balance

- This may make the classes feel like they are not really Introductory or for beginners

- The key to remember is that its all a matter of time and practice

- **We are here to help**

- You'll all end up at the same place by the end

Honor Code

- Resources to consult when completing assignments:

  - Textbook and Lecture Notes

  - Resources listed on the course website, Python3 documentation

  - TAs and Instructors

- Honor Code guidelines

  - "Any work that is not your own is considered a violation of the Honor Code."

  - "Help locating errors and interpreting error messages are allowed, but a student may only receive help in correcting errors of syntax; help in correcting errors of logic is strictly forbidden."

  - "In general, if you are taking photos of someone else's screen, looking at someone else's screen, or telling someone else what to type, it is likely your/their work is no longer the work of an individual student."

Anonymous IDs

- Each of you will use a unique anonymous ID assigned to you for all your submissions

- The goal is to implement anonymous grading

- Your ID is the the following information put together

  - First digit is your Lec section you are in (2 or 3)

  - The remaining digits are your SU Box number

  - For example: Lecture section 2 and SU box number 8766, then your anonymous ID is 28766

2	XXXXX
Lec section	SU Box Number
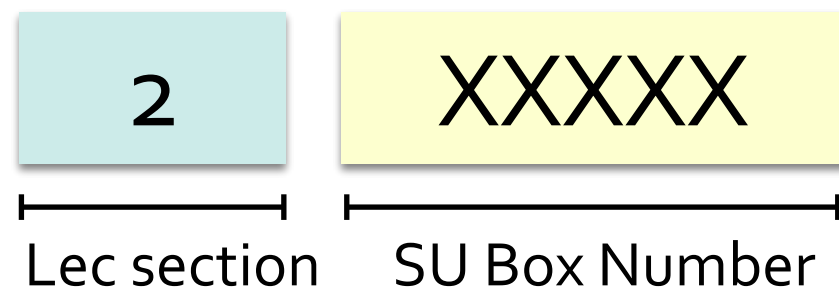
Logistics

- Make sure you received Homework 0

- Homework 0 is due Monday Feb 10 in class

- **CS accounts**

  - Before your lab on Monday/Tuesday, you may receive an email about a Gitlab account created for you

  - Lida will create CS accounts for all of you

  - You will use these accounts for submitting labs

- **Labs** are in **TCL 217A** (behind the stairwell)

  - This door is also always locked!

  - The combination is **1-2-4-8-1-6** (think 1-2-4-8-16)

Preparing for Labs

- We will release lab assignments typically on Friday

- You can find the upcoming lab assignments on the <u>webpage</u>: under labs and homeworks

Home | Shikha's Lectures | Iris's Lectures | Labs & Homeworks | Resources | CS@Williams

Labs

Monday (Tuesday) lab sections have labs due on Wednesday (Thursday) 11 pm respectively.

Date	Topic
February 10/11	Lab 1. Python/Git workflow.

- We expect you to read them over before your lab so that you are ready for questions

- Labs are short: only 1.5 hours

- Make the best of it by coming prepared!

Computer Scientist's Tools

- **Terminal.**

  - Command line or "Shell"

  - Text input/output interface to interact with your computer
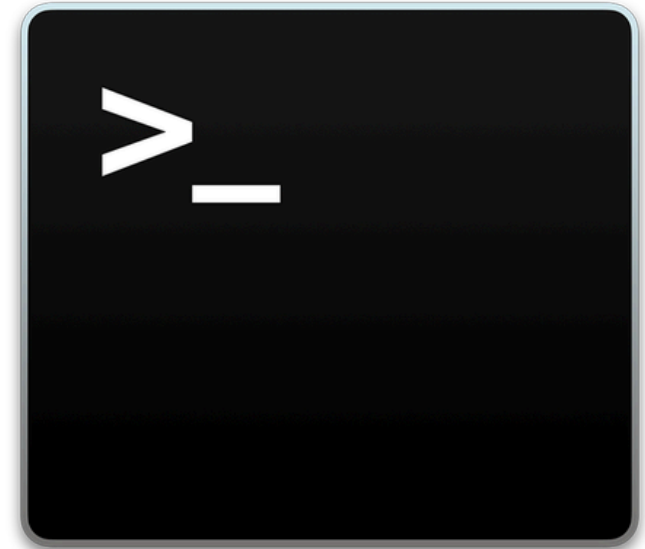
- **Editors.**

- **Git.**

  - Version-control system

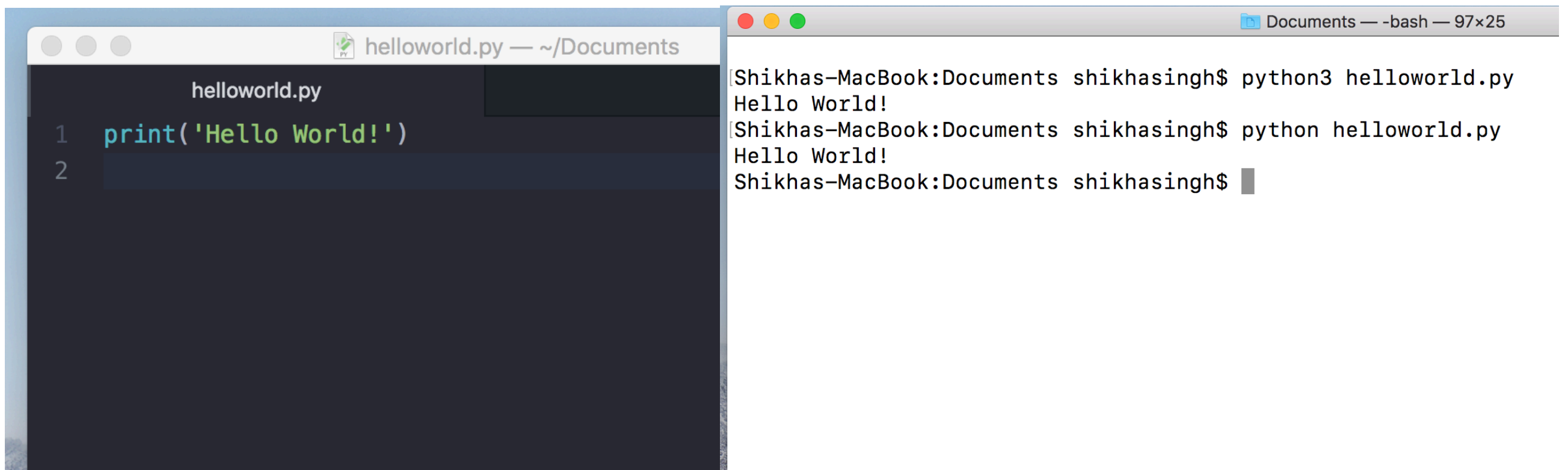 - Save snapshots of your work

Python and Interfaces

- Programming Language: **Python**
  - Created by Guido van Rossum in the late 1980s
- Interfaces we will use to Python:
  - **IPython**
    - Interactive command-line terminal for Python
    - Created by Fernando Perez
    - Powerful interface to use Python
    - Often called a **REPL ('Read-Eval-Print-Loop')**
  - **Jupyter Notebook**
    - Created in 2011, a new web-based interface for Python
    - Teaching aid in class—makes teaching programming more interactive and efficient
    - Also Popular tool for scientific exposition, especially data science (even in languages such as R and Julia)

Installing Python

- Checking version of Python on machine (Mac, Linux)

    - `python --version`

- For this class, we need P`ython 3.6.4` or above

- Installing Python3 on your machine

    - https://www.python.org/downloads/

- Preinstalled on all lab machines

- If your personal machine is Windows

    - You can make it work but there you'd have to troubleshoot a lot

- Recommend doing all lab work on machines in the CS labs instead

Hello World!

- Our first program:

  - Create a file called `helloworld.py`

- Execute a python3 program on Unix (Macs, Linux, not Windows)

  - Type `python3 helloworld.py` and enter

Submitting Labs: Git

- Git is a version control system that lets you manage and keep track of your source code history

- **GitHub** is a cloud-based git repository management & hosting service

    - **Collaboration**: Lets you share your code with others, giving them power to make revisions or edits

- **GitLabs** is similar to GitHub but we maintain it internally at Williams and will use to handle submissions and grading

CS Colloquium Today

- Almost Every Friday

- Time: **2:35pm**, Location: **TCL123** (Wege Auditorium)

- Today: **Faculty Research Presentations**

- + snacks