Welcome to CSCI 134!

Introduction to Computer Science

What is Computer Science?

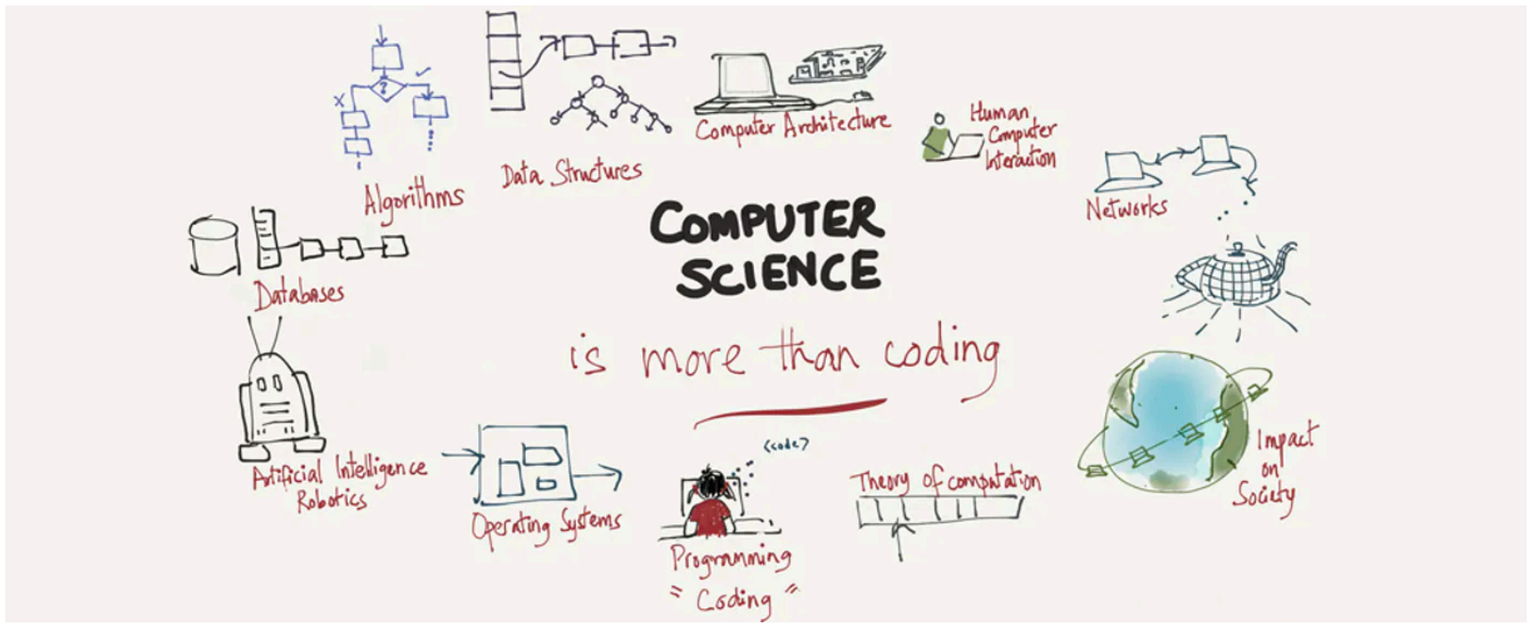
[Hint. It is not really about computers!]

"[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?

- Computer science ≠ computer programming!
- Computer science is the study of what computers [can] do; programming is the practice of making computers do useful things
- Programming is a big part of computer science, but there is much more to CS than just writing programs!
- Another part of CS is computational thinking



https://www.edsurge.com/news/2015-12-02-computer-science-goes-beyond-coding

Computational Thinking

- Computational thinking allows us to take a complex problem, understand what the problem is and develop possible solutions. We can then present these solutions in a way that a computer, a human, or both, can understand.
- Four pillars of CT:
  - Decomposition - break down a complex problem or system into smaller, more manageable parts
  - Pattern recognition – look for similarities among and within problems
  - Abstraction – focus on important information only, ignore irrelevant details
  - Algorithms - develop a step-by-step solution to the problem, or the rules to follow to solve the problem
- A computer can performs billion of operations per second, but computers only do exactly what you tell them to do!
- In this course we will learn how to 1) use CT to develop algorithms for solving problems, and 2) implement our algorithms through computer programs

Behind The Masks…

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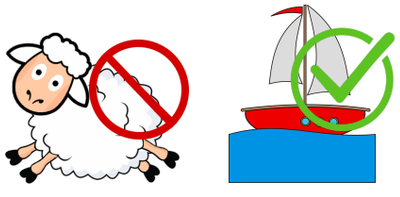

CS134 TA Team

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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 - Fall 2021

Introduction to Computer Science

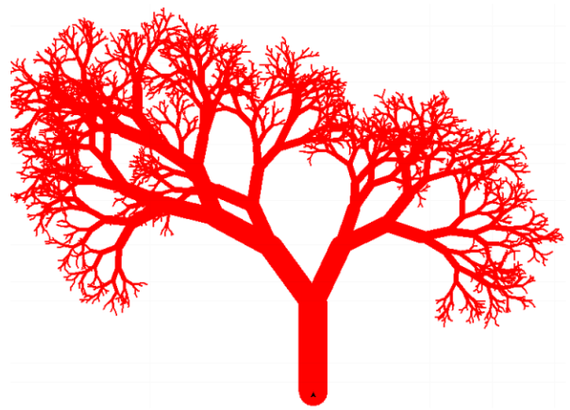
Home | Lectures | Labs & HW | Resources | CS@Williams

Home

Instructors:	Jeannie Albrecht | Email: jeannie@cs.williams.edu | Office: TCL 305
	Shikha Singh | Email: shikha@cs.williams.edu | Office: TCL 304
	Kelly Shaw (labs) | Email: kelly@cs.williams.edu | Office: TCL 309
Technical Support:	Lida Doret | Email: lida@cs.williams.edu | Office: TCL 205
Lectures:	MWF 9am (with Singh) or MWF 10am (with Albrecht)
Labs:	M 1:10-2:25pm, with Singh; or M 1:10-2:25pm or 2:35-3:50pm, with Shaw; or T 1:10-2:25pm, with Albrecht; or T 1:10-2:25pm or 2:35-3:50pm, with Shaw
Textbook:	(Recommended) *Think Python (2nd Edition)*, found at greentreepress.com and here (Alternate) *Introduction to Computation and Programing Using Python, (2nd Edition)*, found at Amazon
TAs:	TBD
Help Hours:	See Course Calendar (below)

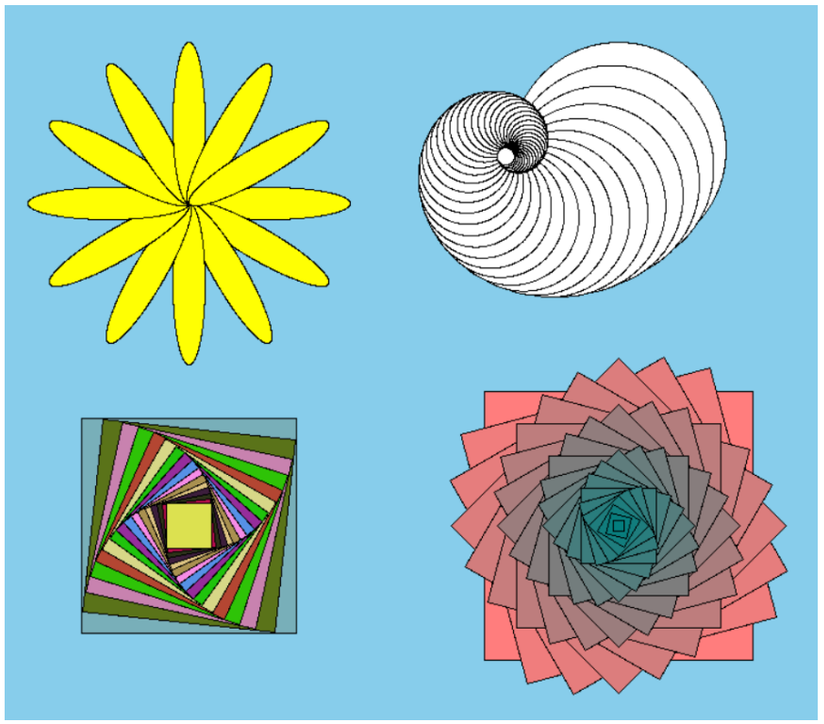
Topics/ Concepts

- 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
- Transitioning from python to Java

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



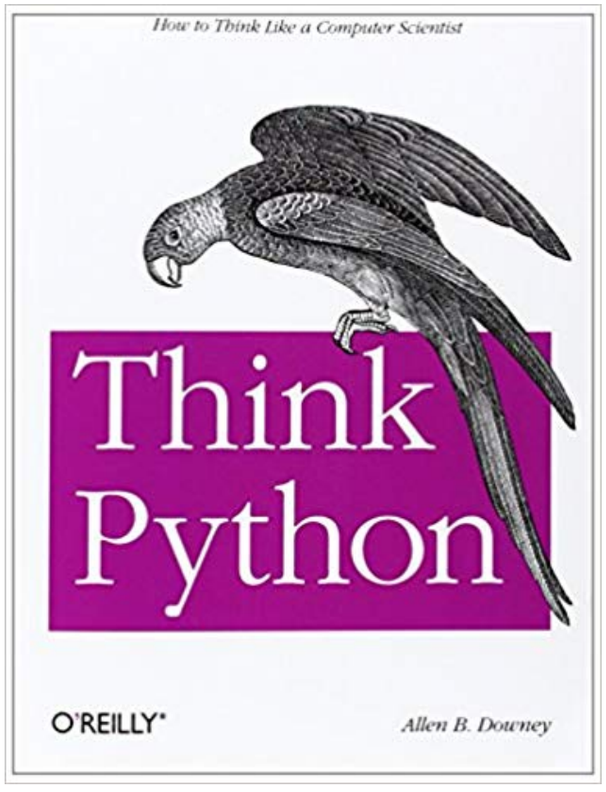
Syllabus/Schedule

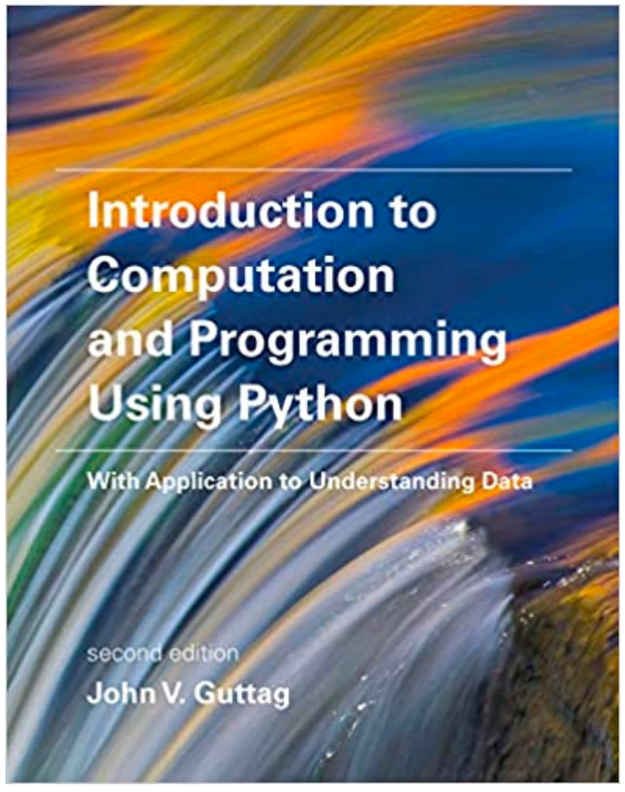
- Available on the course webpage

Date	Week's lab	Monday	Wednesday	Friday
9/10		—	—	1. Welcome
9/13	I. Python & Git	2. Types	3. Conditionals	4. Functions
9/20	II. Day of the Week	5. Python Usage Modes	6. Strings	7. Iteration
9/27	III. Word Toolbox	8. More Iteration	9. Lists & Files	Mountain Day
10/4	IV. Voting	10. Comprehensions	11. Tuples & Sets	12. Mutability
10/11	—	Reading Period	13. Dictionaries	14. Plotting
10/18	V. Debugging	15. Turtle Graphics	Midterm	16. Recursion
10/25	VI. Supreme Court	17. Recursion	18. Classes	19. Classes
11/1	VII. Recursion	20. Classes	21. List Design	22. List Design
11/8	VIII. K-means	23. Inheritance	24. Lambdas	25. Sorting
11/15	IX. Ciphers	26. Sorting	27. Searching	28. Big Oh
11/22	—	29. TBA	Thanksgiving	Thanksgiving
11/29	X. Misc	30. Java	31. Java	32. Java
12/6	XI. Java	33. Misc	34. Wrap up	35. Review
	Final			

Textbook(s)

- **Think Python**: How to think like a computer scientist by Downey: http://greenteapress.com/wp/think-python-2e/
- Introduction to Computation and Programing Using Python, (2nd Ed) by Guttag
- Recommended, but not required
- Chapters are assigned on the course schedule/syllabus



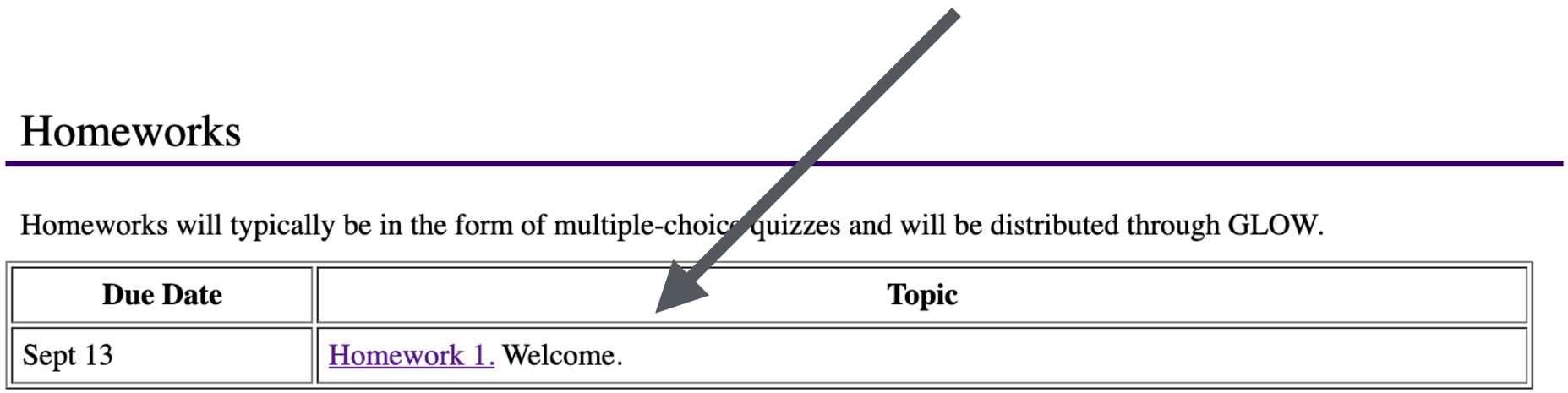


Grading Breakdown

- **Homeworks (10%)**
  - Short answer programming & problem solving questions
  - Due every Monday (usually on GLOW)
  - Practice using "pencil and paper" before submitting answers
- **Labs (40%)**
  - Meet Mon/Tues for a 1.5 hours
  - Monday labs → Wed @ 10pm | Tuesday labs → Thurs @ 10 pm
  - Review lab as soon as it comes out (~Fridays)
  - Meet with herd before scheduled lab session
- **Midterm (25%)**
  - Evening exam on **Wed, October 20**
- **Final (25%)**
  - Scheduled Final Exam
- **Participation +/- 5%**

Homework

- Homework 1 is out; linked on the course webpage:



Homeworks

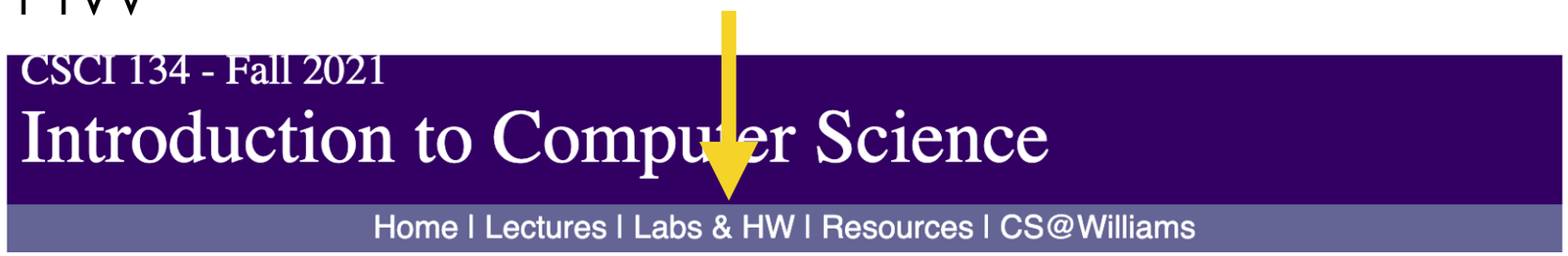
Homeworks will typically be in the form of multiple-choice quizzes and will be distributed through GLOW.

Due Date	Topic
Sept 13	Homework 1. Welcome.

- It is a google form to get some information about you and your availability for herd scheduling
- Due Monday Sept 13 by 10 pm
- Future homework assignments will also be linked on the course webpage, and will direct you to the course GLOW

Labs

- We will release lab assignments typically on Friday
- You can find the upcoming lab assignments on the webpage: under Labs and HW



Labs

Lab assignments are due Wednesday 10 pm EST for students in Monday lab sections, and Thursday 10 pm EST for students in Tuesday lab sections.

Date	Topic
Sept 13/14	Lab 1. Python/Git workflow.

- We expect you to read over the lab before your herd meeting
- Labs should be well underway when you arrive at your scheduled lab section on Mon or Tue
- Labs are short: only 1.5 hours! Make the best of it by coming prepared!

Herd Meeting

- Based on availability, we will create small groups (~6 students) and assign them to a specific TA
- The group ("herd") is strongly encouraged to meet with their herd TA for an hour between Friday-Monday and discuss the next lab
- The goal is for you to get a start on your lab, with the TA's help
- Please provide us as much availability as possible when completing Homework 1 so that we can find a suitable herd for everyone
- Choose a convenient location to meet
- More details to come next week

Logistics

- **CS accounts**
  - You must have received an email from Lida about your CS account. This is a *separate* account from your campus account!
  - You will use these accounts for submitting labs
- **Labs** are in **TCL 217A and TCL 216** (behind the stairwell)
  - This door is also always locked!
  - The combination is **3-9-2-7-8-1** (think 3-9-27-81)
- Each of you will be assigned a unique anonymous ID assigned
  - Allows us to implement anonymous grading
  - Your email from Lida will also contain this info
  - Do not share your ID

Weekly Workload Summary

MON	TUE	WED	THU	FRI	SAT	SUN
Lab	Lab	Next HW posted		Next Lab posted	Herd meetings	
		Graded Lab returned			Work on HW	
HW due 10 pm		Mon Labs due 10pm	Tues Labs due 10pm		Review Lectures	

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."
  - PLEASE DO NOT CHEAT!
  - If you aren't sure if something is considered a violation, just ask (beforehand)!

Public Health Reminders

- Masks that fully cover your nose and mouth are required at all times if you are indoors…this includes classrooms and labs
- No eating or drinking in the lab
- Use hand sanitizer as you enter and exit the lab
- Do not spray the keyboards!
- If you feel sick, do not come to class or lab!
    - Contact your instructors and we'll figure out a plan

About Class Participation

- **We like interaction in our classes!**
- Many ways to participate:
  - Ask questions! (there are no bad questions!)
  - Answer questions (there are no wrong answers!)
  - Laugh at our jokes… (no guarantees here)
  - Talk to us after class/come to office hours
- Class participation does not mean dominating classroom discussions or interrupting your peers

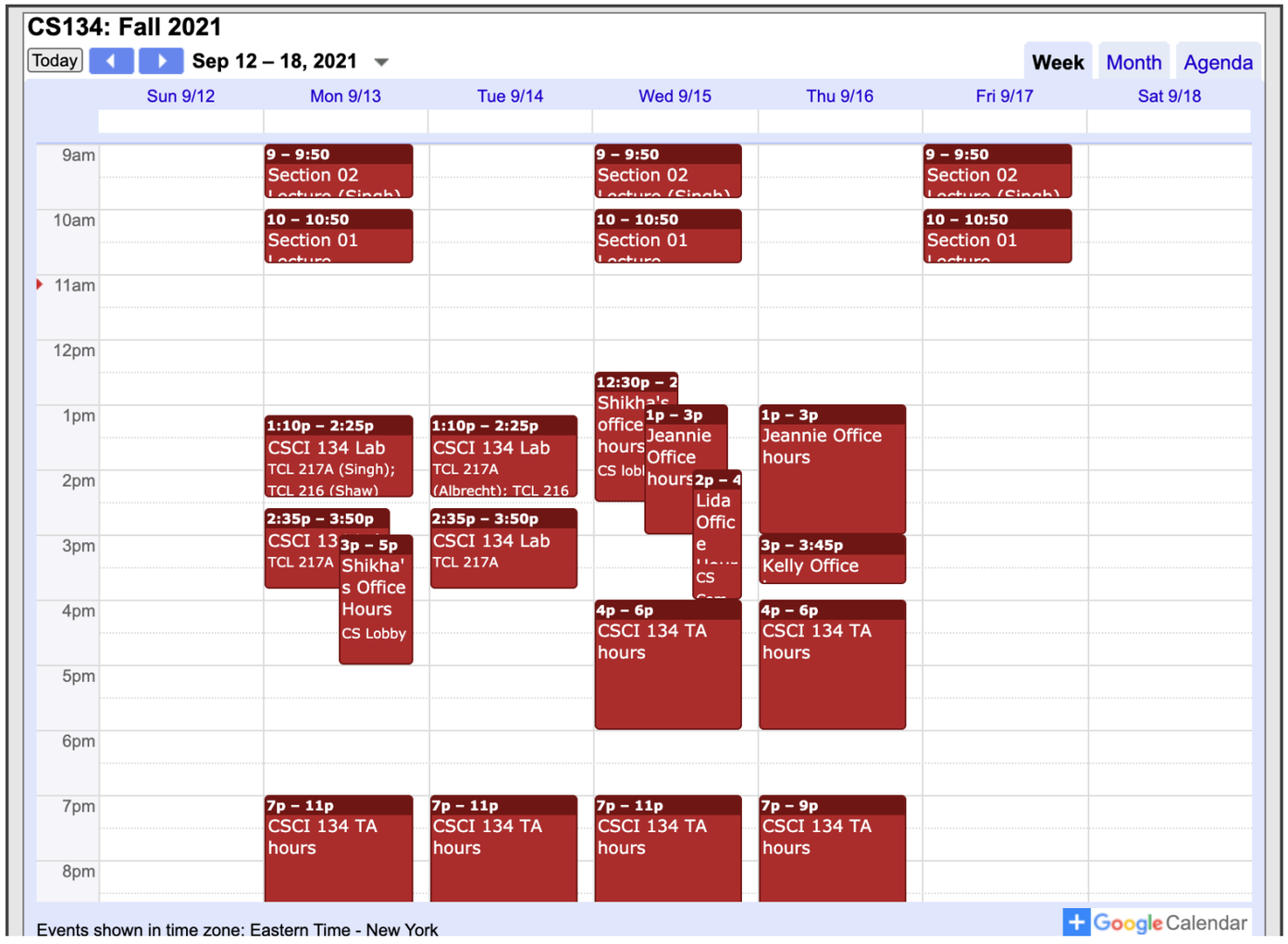
Bottom line. *Help create a vibrant, positive and inclusive classroom environment!*

Fast Paced Course

- How to succeed:
    - Read/skim recommended textbook chapters before class
    - Read and think about labs as soon as they are released
    - Seek help! Use resources! We are all here to help you!
- 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

Course Support: Office Hours

- Office hours (chance to discuss labs, homework, weather, sports, etc! We like to chat!)
  - Shikha: Mon 3pm-5pm, Wed 12:30-2:30
  - Jeannie: Wed and Thur 1pm-3pm
  - Kelly: Thur 3pm-4:30pm
  - Lida: Wed 2pm-4pm
- See calendar on course webpage
- Will be held in instructors' offices or CS common room



Course Support: TA Hours

- ~14 teaching assistants (TAs) assigned to this course
- Will be held in CS labs (TCL 216 and 217A)

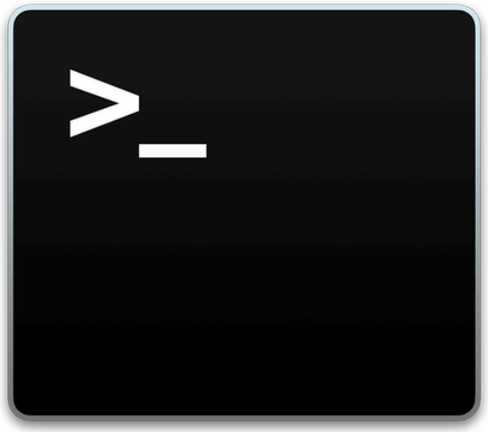
MON	TUE	WED	THU	FRI	SAT	SUN
		4-6 pm	4-6 pm			
7-11 pm	7-11 pm	7-11 pm	7-9 pm			

Intro Programming and Beginner Skiing

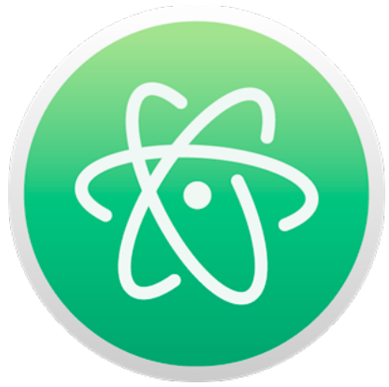
- Everyone starts at a different place with varying level of familiarities with the same or related activities
    - Maybe you have ice-skated or programmed a little Java in high school
- Different people learn at different rates
    - Some people just have really good balance!
- Do not be intimidated by classmates who seem to know more than you!
- Learning any new skills takes time and practice
- **We are here to help!**
- You'll all end up at the same place

Computer Scientist's Tools

- **Terminal**
  - Command line or "Shell"
  - Text input/output interface to interact with your computer



- **Editor**
  - Atom



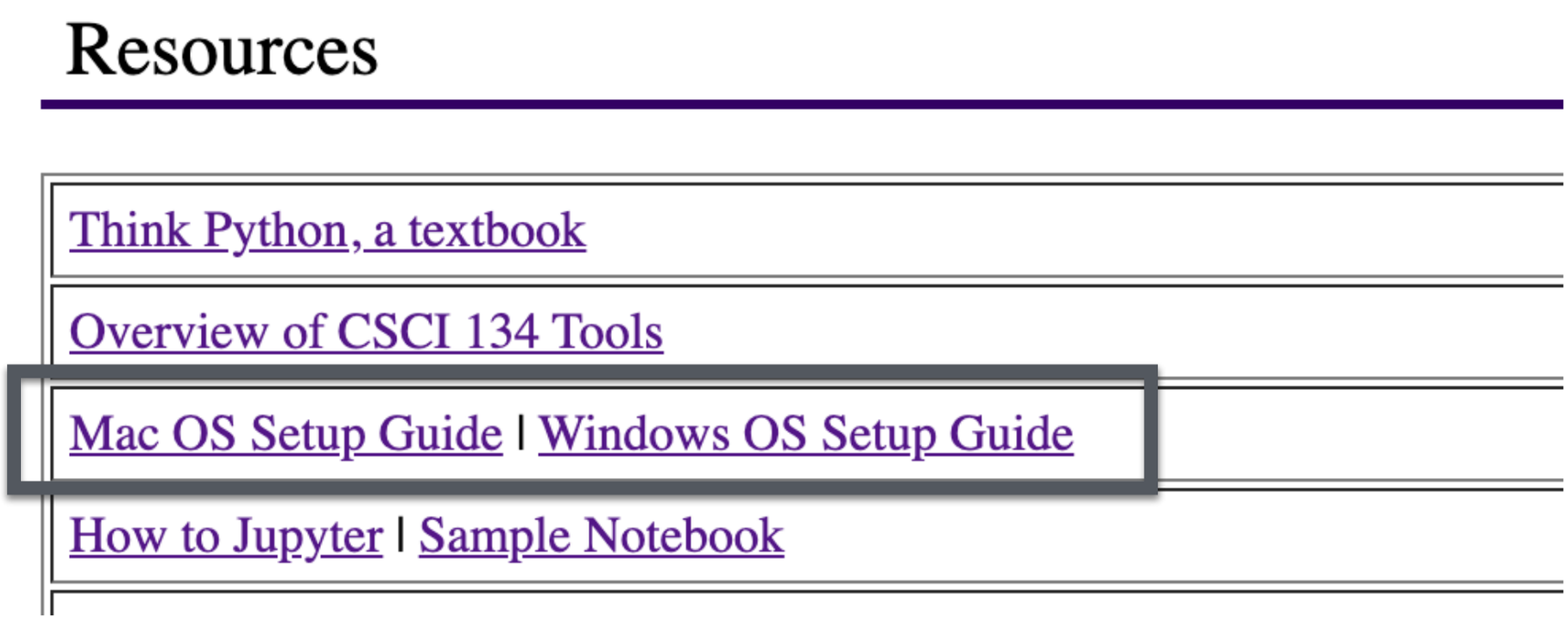
- **Git**
  - Version-control system
  - Save snapshots of your work
  - Submit work for grading

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)

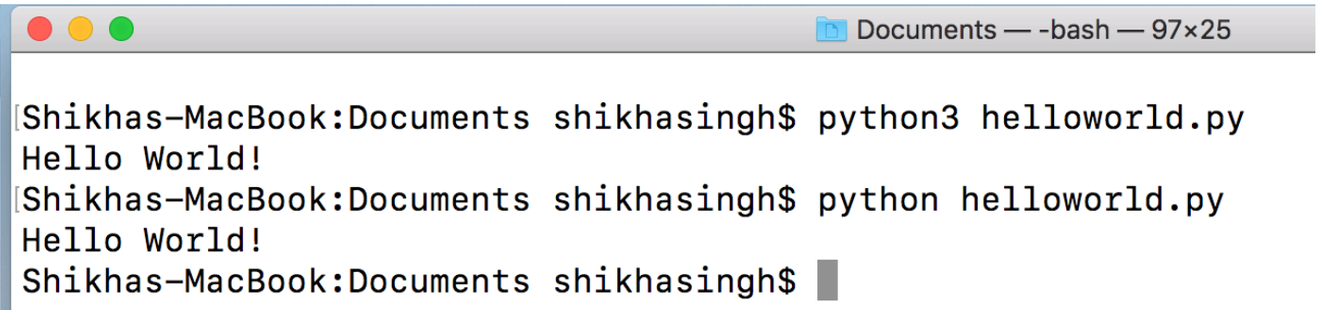
Setting up your Computer

- In lab, you'll use our pre-configured computers (Mac)
- But we strongly encourage you to configure your machine so you can work on your own!
- Please follow the Mac or Windows Setup Guide (found under Resources on course webpage)
- Do this SOON! Ask for help by September 16 (Thursday).
- Come see us if you get stuck!



Hello World!

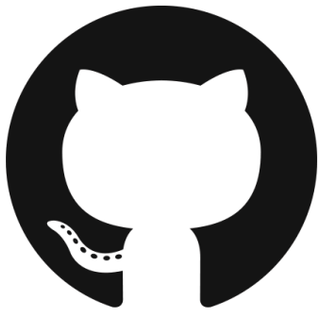
- Our first program:
  - Create a file called **`helloworld.py`**
- Execute a python3 program on Unix (Macs, Linux, not Windows)
  - Type **`python3 helloworld.py`** and enter



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: Welcome Back Colloquium
    - Meet the CS faculty
    - Find out about CS events and student clubs (UniCS, CoSSaC, Women in CS)
- Great way to engage with the CS community @ Williams