Welcome to CSCI 134!
Introduction to Computer Science

Sept 10, 2021

Shikha Singh, 9AM
Jeannie Albrecht, 10AM
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

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 perform 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...

Shikha Singh
shikha@cs.williams.edu
She/Her/Hers
TCL 304

Jeannie Albrecht
jeannie@cs.williams.edu
She/Her/Hers
TCL 305

Kelly Shaw
kshaw@cs.williams.edu
She/Her/Hers
TCL 309

Lida Doret
lida@cs.williams.edu
She/Her/Hers
TCL 205
CS 134 TA Team

Lea Obermüller
Mira Sneirson
Tasan Smith-Gandy
Jacob Chen
Sophie Goldstein
Elijah Washington
Sarah Fida

Lindsey Chu
Aaron Schroen
Kirun Cheung
Nathan Thimothe
Andrew Muhareb
Gavin Li
Caleb Dittmar
CS134: Course Website

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

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**CSCI 134 - Fall 2021**

**Introduction to Computer Science**

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

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**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](http://greentreepress.com) and [here](#)
- **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
## Syllabus/Schedule

- Available on the course webpage

<table>
<thead>
<tr>
<th>Date</th>
<th>Week’s lab</th>
<th>Monday</th>
<th>Wednesday</th>
<th>Friday</th>
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</thead>
<tbody>
<tr>
<td>9/10</td>
<td></td>
<td>1. Python &amp; Git</td>
<td>2. Types</td>
<td>3. Conditionals</td>
</tr>
<tr>
<td>11/1</td>
<td>VII. Recursion</td>
<td>23. Inheritance</td>
<td>27. Searching</td>
<td>28. Big Oh</td>
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<tr>
<td>11/8</td>
<td>VIII. K-means</td>
<td>26. Sorting</td>
<td>Thanksgiving</td>
<td>Thanksgiving</td>
</tr>
<tr>
<td>11/15</td>
<td>IX. Ciphers</td>
<td>29. TBA</td>
<td>31. Java</td>
<td>32. Java</td>
</tr>
<tr>
<td>11/22</td>
<td></td>
<td>30. Java</td>
<td>34. Wrap up</td>
<td>35. Review</td>
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<tr>
<td>11/29</td>
<td>X. Misc</td>
<td>33. Misc</td>
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<tr>
<td>12/6</td>
<td>XI. Java</td>
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**Final**

**Midterm**
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:

<table>
<thead>
<tr>
<th>Due Date</th>
<th>Topic</th>
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<tbody>
<tr>
<td>Sept 13</td>
<td>Homework 1, Welcome.</td>
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Homeworks will typically be in the form of multiple-choice quizzes and will be distributed through GLOW.

• 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

<table>
<thead>
<tr>
<th>Date</th>
<th>Topic</th>
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<tr>
<td>Sept 13/14</td>
<td>Lab 1, Python/Git workflow.</td>
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• 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
<table>
<thead>
<tr>
<th>MON</th>
<th>TUE</th>
<th>WED</th>
<th>THU</th>
<th>FRI</th>
<th>SAT</th>
<th>SUN</th>
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<tbody>
<tr>
<td>Lab</td>
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<td>Next HW posted</td>
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<td>Next Lab posted</td>
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<td>HW due 10 pm</td>
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<td>Graded Lab returned</td>
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<td>Mon Labs due 10pm</td>
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<td>Tues Labs due 10pm</td>
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<td>Herd meetings</td>
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<td>Work on HW</td>
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<td>Review Lectures</td>
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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)

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<td>4-6 pm</td>
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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!

Resources

- Think Python, a textbook
- Overview of CSCI 134 Tools
- Mac OS Setup Guide | Windows OS Setup Guide
- How to Jupyter | Sample Notebook
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