CSC 111:
Intro to Computer Science through Programming

Spring 2017
Prof. Sara Mathieson
Pick up a syllabus and a notecard

I will sign forms and discuss registration issues after class!
Outline: 1/27

- Introductions
- What is computer science?
- Syllabus
- Introduction to Python
- IDLE demo
- Liaisons
Introductions
To discuss with a partner...

1) Why did you decide to take this course?

2) What are you hoping to gain from this course?

3) Any particular topics you would like to cover?
What is Computer Science?
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What is computer science?

- Using the theory and practice of computational thinking to solve complex problems, both abstract and concrete
- So... what is computational thinking?
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- Ideas of *automation* and *procedure*
  - Example: finding a book in the library
What is computer science?

+ Using the theory and practice of computational thinking to solve complex problems, both abstract and concrete

+ So... what is computational thinking?

+ Ideas of **automation** and **procedure**
  + Example: finding a book in the library

No mention of a computer or a programming language!
Computer Science research areas

- Artificial Intelligence
- Computer Architecture
- Computational Biology
- Databases
- Computer Science Education
- Computer Graphics
- Human-Computer Interaction
- Operating Systems
- Programming Languages
- Scientific Computing
- Cyber Security
- Theory

Credit: UC Berkeley EECS, https://www2.eecs.berkeley.edu/Research/Areas/CS/
Artificial Intelligence

Jeremy Hsu, IEEE Spectrum
Computational Biology

Figure credit: “Genome-wide association study of 14,000 cases of seven common diseases and 3,000 shared controls” by the Wellcome Trust Case Control Consortium

- Bipolar disorder
- Coronary artery disease
- Crohn’s disease
- Hypertension
- Rheumatoid arthritis
- Type 1 diabetes
- Type 2 diabetes
Databases

Figure credit: “Distributed transactions across cloud databases” – Microsoft Azure Database

Distributed transactions on Azure SQL Database

.NET Framework app
Version 4.6.1

DATA APP

Azure worker role(s)

Participants

Non participants

SQL Database

Coordinator

Transaction scope
Computer Science Education

Scratch Programming - EngagingEducators.com
Computer Graphics

“Adaptive tissue modeling”
Vidal et al, 2006

“Zootopia”
Disney, 2016

Fruit image: blender.org
Universal ATM Interface by Kristin Suzanne Bessette
Operating Systems

User

Application

Operating System

Hardware

Mac OS X

Windows

Linux

Wikimedia Commons (by Golftheman)
Programming Languages

- Python
- MATLAB
- WebGL
- R
- Java
Scientific Computing

“A numerical solution to the heat equation on a pump casing model using the finite element method.” – Wikipedia
Cyber Security

Credit: Hugh Boyes (2014)
Theory

"An artistic representation of a Turing machine. Turing machines are used to model general computing devices." – Wikipedia
Syllabus
Important Course Info

- 5 credit course = 15 hours/week

  5 in class/lab, 10 outside class

- Class time adjustment: M/W/F 9:10-10:20 for Section 2

- Websites:
  1) Course website → http://cs.smith.edu/~ssheehan/spring17/csc111/home.html
     Username: csc111, Password: spring17
  2) Moodle
Enrollment Issues

- Lecture is okay (I will go up to 60 in each section)

- Labs are still imbalanced (up to 30 in each)
  - I will sign your form today if you are on a waitlist on BannerWeb or can do a Wednesday lab
  - Next week, if you can do a Wednesday lab, go on Wednesday, otherwise go to the lab you’re signed up for
Laptops

- If you do not have a laptop to bring to class/lab, send me an email by the end of today

- I will send out instructions about how to pick up a laptop

- Occasional in-class programming exercises (bring laptop)

- Lab: always bring laptop
Course Staff

+ Lab Instructor: Dave Marshall

+ TAs:  
  - Artemis Metaxa-Kakavouli  
  - Farida Sabry  
  - Val McCulloch  
  - Youyou Tian  
  - Eleanor Ewing  
  - Riley Mancuso  
  - Alice Yang  
  - Zoe Kendall

http://cs.smith.edu/classwiki/index.php/Computer_Science_TA_hours

+ Reader: Farida Sabry

+ Graders: 2 UMass graders (TBA)
Prerequisites

+ None!
Course Goals

+ Develop an understanding and “working knowledge” of foundational computer science principles

+ Be able to implement ideas and solutions in code (Python)

+ Appreciate the ties computer science has to other disciplines
Homeworks

+ (Roughly) weekly homeworks

+ Due Tuesday night at midnight on Moodle
  + First assignment out Jan 31, due Feb 7

+ In Python, but occasionally will have a written component
Labs

- Wednesday and Thursday (if you don’t finish, the last time to submit will be Friday night)

- Pair-programming (very important skill!)
  - One person is the “driver” who is writing the code
  - One person is the “navigator” who is observing each line of code and usually has instructions/documentation/google open
  - Switch half way through lab (after 1 hour)
Topics and Skills

- What is computer science?
- Variables and expressions
- Functions and argument passing
- Loops and conditionals
- Ints, floats, strings, booleans
- Lists
- Graphics
- Style and documentation
- Testing and debugging
- Reading/writing files
- Liberal arts module
- Sets and dictionaries
- Recursion
- Classes and objects
Textbook

+ “Python Programming: an introduction to Computer Science” 2nd edition by John Zelle

Amazon Link ($20)

+ Reading for this week: Chap 1.1-1.7
Piazza: Online Discussion

- Class discussion
- Homework help
- Clarifications
- Announcements
Office Hours and TA hours

- Should go at least once throughout the semester
- Please attend TA hours, even if you don’t need help!
- Usually many students in office hours, try to work in groups
- My hours: Thursday 11am-1pm (Ford 015), Monday (TBA)
- TA hours:
  - Sunday 1:30 - 3:30 PM, Ford 241
  - Sunday 7:30 - 9:30 PM, Ford 241
  - Monday 7:30 - 9:30 PM, Ford 241
  - Tuesday 7:30 - 9:30 PM, Ford 241
  - Wednesday 7:30 - 9:30 PM, Ford 241
  - Thursday 7:30 - 9:30 PM, Ford 241
Course Work

+ Homework: 40% (roughly 10, one will be dropped)
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Note: must pass at least one exam to pass the course
What is participation?

**Positive participation**: engaging with the course in a way that not only deepens your understanding, but helps your peers

1) Asking questions in class
2) Answering questions in class (generates ideas)
3) Asking and answering questions on Piazza
4) Helping another student in office hours or TA hours
5) Active participation in labs and in-class activities
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+ **Negative participation**: engaging in the course in a way that is disruptive or prevents others from learning
  1) Always being the one to ask or answer questions in class
  2) Monopolizing office hours or TA hours
  3) Excessive email to me or other course staff
Honor Code

• Collaboration is encouraged!

• Please cite:
  • Student collaborators
  • Online resources
  • Books (excluding our textbook)

• For homework assignments: individual, original code, produced and understood by you

• For labs: one set of code, submitted by each person

• Rule of thumb: should never copy and paste code
“Smith College expects all students to be honest and committed to the principles of academic and intellectual integrity in their preparation and submission of course work and examinations. All submitted work of any kind must be the original work of the student who must cite all the sources used in its preparation.”
Course Policies

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- **Late work**: no late work, one homework and one lab dropped
  
  Exceptions: accommodations letters, notice from Dean or Health Services
Course Policies

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- **Attendance**:
  - You MUST attend the lab section you are registered for
  - Patterns of missed lectures will significantly affect your participation grade
  - Please do not come in late to class/lab, or pack up early
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- **Questions before class**: please limit so I can prepare AV (absolutely no homework questions before/during/after class, please come to office hours or TA hours)
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- **Checking work**: please do not ask me to check work to see if it will receive full credit
Resources

- Piazza
- Office hours
- TA hours
- Fellow students (form a study group!)
- Spinelli Center for Quantitative Learning
- ODS and Accommodations (turn in early!)
Introduction to Python
What is a programming language?

- Syntax and keywords
  - Today: `print` and `def`

- Algorithm for understanding how syntax is executed

- Python is interpreted

Follow along: https://www.python.org/downloads/

Credit: Dominique Thiebaut
Today’s concepts

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- **Invoke**: call a function that has been previously defined
- **Parameter or argument**: changeable part we give to a function
IDLE demo

Integrated Development Environment

To find IDLE:
Mac: Applications
Windows: All Programs
Notecards
On a notecard, please fill out:

1) Name (first and last)
2) BannerWeb name/or and Moodle name if different from above
3) Pronoun
4) Previous programming experience
5) Most advanced math course taken or currently taking
6) House
7) Favorite hobby
8) Anything else that would be helpful for me to know!
Liaisons