

CMPT 100: Introduction to Computer Science

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Hello, world.
I am ...



Ice fest, Toronto

You have **2 minutes** to think what would you answer to the following prompt:

Describe “computer” or “computer science”

What is Computing Science?

- “Computing [Science] is the study of **information processes**, *natural* and *artificial*.” Peter Denning, 2010
- “The computer is a tool in these studies but is not the object of study.” Peter Denning
- “Computing is no more about computers than astronomy is about telescopes.” Edsger Dijkstra

BIG QUESTIONS IN CS

CS != Programming

- How is information represented?
- How is information processed?

| ALGORITHM |

a precise sequence of steps for carrying out a task

Why CS?

Why CS?

1. Makes you a **creative** problem solver
2. Gives you a set of tools that enhances your abilities to explore and interact with the world
3. Gives an opportunity to develop useful applications

Two types of knowledge

- **Declarative** knowledge involves **knowing** that something is the case (**facts**):
 - J is the tenth letter of the alphabet
 - Paris is the capital of France.
- **Procedural** (Imperative) knowledge involves knowing **HOW** to do something
 - Ride a bike
 - Bake a cake
 - Solve a puzzle

Our first algorithm

Input:

- wolf, goat, cabbage
- you

Goal:

- Transfer everything across the river

Constraints:

- Boat capacity: you + one
- Wolf eats goat
- Goat eats cabbage



From: *Kordemsky: The Moscow Puzzles, 1954*

Our first algorithm

Input:

- wolf, goat, cabbage
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From: *Kordemsky: The Moscow Puzzles, 1954*

Developing solutions in
constrained environments

Algorithm 2

Input:

- 5 soldiers (adults)
- 2 boys (children)

Goal:

- Soldiers have to cross the river

Constraints:

- Boat capacity: 1 adult or 2 children

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<https://www.youtube.com/watch?v=6kaIMB8jDnY>

Bicycles for the Mind

- Compare speed of condor with the speed of man – we lose
- Compare speed of condor with the speed of man on a bicycle – we win!

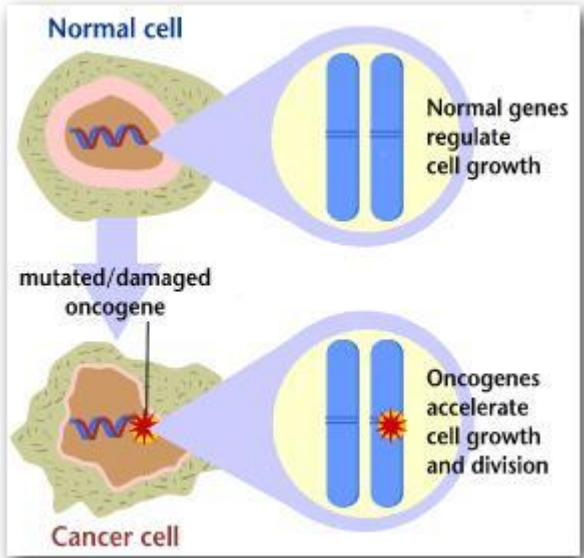
“And that’s what a computer is to me. What a computer is to me is it’s **the most remarkable tool that we’ve ever come up with**, and it’s the equivalent of a bicycle for our minds.”

Steve Jobs, 1990

Discovery

- Doolittle (1983) noticed similarity between **Simian sarcoma viral oncogene** and **PDGF growth factor** when he **manually** copied sequences into a database
- Hypothesis: an oncogene is just a transformed growth factor
- The hypothesis was correct: cancer is caused by displacement of a normal cellular regulatory gene!

Computer programs discover new oncogenes searching for similarities to normal genes



Oncogene	Normal gene
Sis PDGF	B chain of truncated EGF
Erb-B receptor	small GTPase tyrosine
Ras	
Src kinase	
E-myc	DNA-binding protein

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To be programmed or to be a programmer?



app store - not a place to spend money but
opportunity to satisfy somebody else's needs

Ubiquitous CS



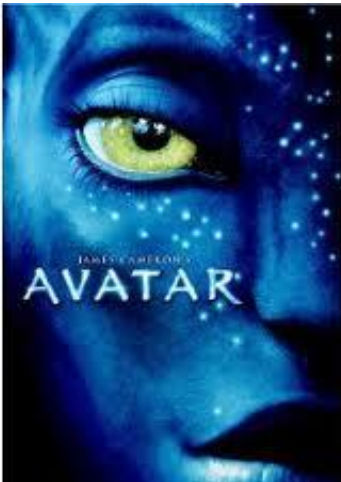
Social Networking

Human Computer Interaction

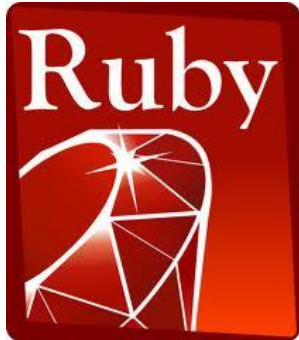
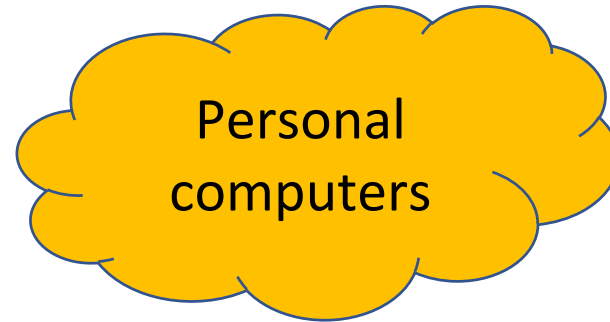


Ubiquitous CS

Graphics



Ubiquitous CS



iOS



Ubiquitous CS

Robotics





Theory



Architecture



Security



Algorithms



Databases

And there's more to
CS!



Computational
Biology



Computer
Networks

Extending humans with software

- Argus II Retinal Prosthesis System:
 - prosthesis the size of a pencil eraser surgically implanted onto retina
 - pair of eyeglasses with built-in video camera.
- Information from the camera wirelessly transmitted to electrodes in the implant, turned into images, which are transmitted to the brain
- <http://www.ctvnews.ca/health/blind-woman-becomes-first-in-quebec-to-try-bionic-eye-1.3561847>

CMPT 100: Outcomes

- Discuss **main ideas in CS** and learn **basics of programming**
- Not developing ~~software~~ but writing *programs* where we are the programmers and the users at the same time
- Main outcome: **final project**
- Sample projects: demo
- You can (and should) submit your own project proposal but it has to be approved

Course mechanics

- To ensure that you work regularly:
 - Weekly lectures
 - Weekly exercises (at home). Weekly quizzes (in class).
 - Bi-Weekly homework
 - Final project and demo (due: last week of classes)
 - Midterm exam
 - Final exam (scheduled by the college)

Grading

- Weekly programming quizzes: 15%
 - Midterm exam: 10%
 - Weekly homework assignments: 25%
 - Final project* and demo: 25%
 - Final exam*: 25%
-
- Weekly quizzes can contribute up to 5% to your final exam

*You have to score **at least 50%** on both final project and the final exam in order **to pass the course**

Information sources

- Main textbook:

<http://openbookproject.net/thinkcs/python/english3e/>

- Additional readings will be occasionally posted on the class web page
- **BUT**: this course is not about ~~reading~~, but about **DOING**

Plagiarism

Do not copy code from each other
or from the Internet

Presenting somebody else's work as your own is a **major academic offense** and will be heavily persecuted - failing the assignment, failing the course, failing the college

Student Handbook 2018 - 2019

Honesty and integrity in the performance of all academic assignments are expected of all students at Simon's Rock. Plagiarism, the giving or receiving unauthorized assistance on any examination, quiz, lab or homework assignment; and falsifying data all are serious forms of academic dishonesty and will not be tolerated.

A student who submits, without acknowledgment, work that is not their own has committed **plagiarism**. Plagiarism occurs even when a single sentence, phrase or wording is copied without attribution.

A first offense -> at least a **grade of F on the assignment** or exam and may result in a **semester grade of F** for the course.

Any subsequent offense will become part of the student's record -> **academic probation, revocation of scholarship, and suspension from the College.**

**DO NOT FALL BEHIND!
ASK QUESTIONS!
NEVER LEAVE WITHOUT
CLARIFYING EVERYTHING!**

Google classroom

- Sign into Classroom at classroom.google.com with your [simons-rock account](#)
- On the homepage, click Add and then Join class
 - Enter the code **9lgur7** and click Join
 - You can only **use your simons-rock Gmail login** to use google resources provided by the college

Help: tutors

- We have a great team of tutors
- Each tutor will post a schedule when they are available to help you with the setup or homework
- You have to **make an appointment with the tutor** in advance (over an e-mail)

- In addition, there will be **weekly tutoring sessions** to explain exercises
- **Think Tank**, located in the Informal Lounge in the Student Union, is staffed on Sundays, Tuesdays, and Thursdays from 7 p.m. until 10 p.m. by 3 math and science tutors

FOR THE NEXT CLASS....

- Get Python working on your machine: <https://www.python.org/downloads/>
- We need **Python 3**
- Python 3 executable should be added to the PATH

Testing the installation:

Open terminal or command prompt and type:

`python`

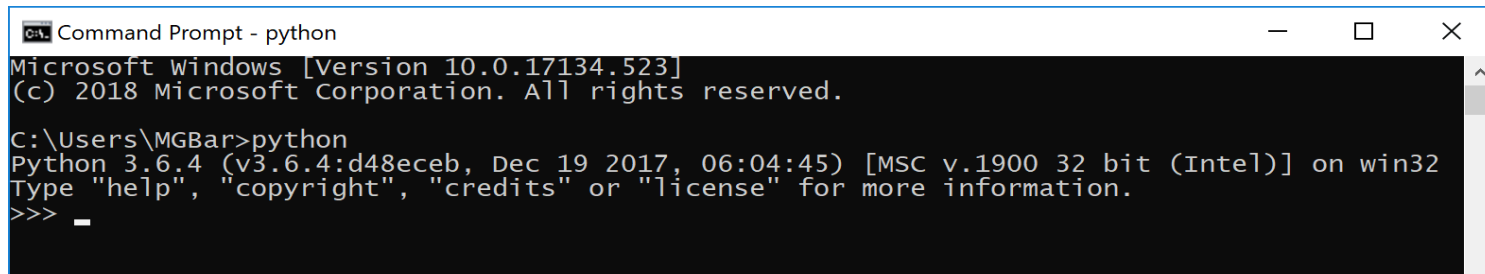
or sometimes (on Mac):

`python3`

You should see the interactive Python shell

To exit the interactive shell, type

`quit()`

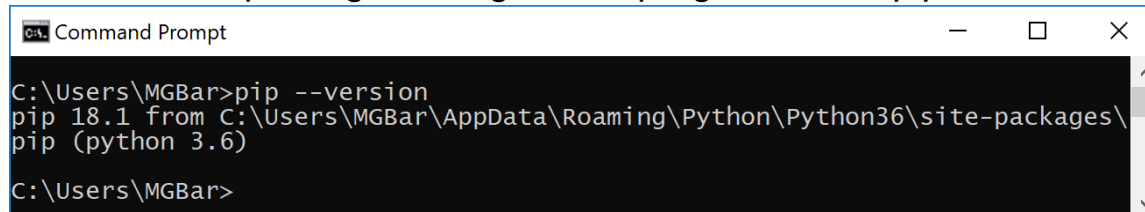


```
Command Prompt - python
Microsoft Windows [Version 10.0.17134.523]
(c) 2018 Microsoft Corporation. All rights reserved.

C:\Users\MGBar>python
Python 3.6.4 (v3.6.4:d48eceb, Dec 19 2017, 06:04:45) [MSC v.1900 32 bit (Intel)] on win32
Type "help", "copyright", "credits" or "license" for more information.
>>> _
```

Test that you also installed the package manager - the program called *pip*:

`pip --version`



```
Command Prompt

C:\Users\MGBar>pip --version
pip 18.1 from C:\Users\MGBar\AppData\Roaming\Python\Python36\site-packages\
pip (python 3.6)
C:\Users\MGBar>
```

- If you are unable to properly install Python on your own, ask one of the tutors or ITS for help.