SFU SIMON FRASER UNIVERSITY
ENGAGING THE WORLD

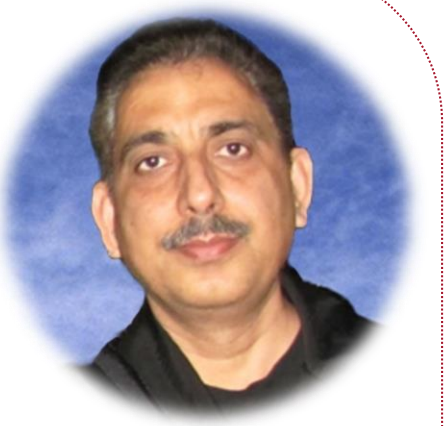
CMPT 120: Introduction to Computing Science and Programming 1

Welcome to

Computing Science

python™

Hello!



I'm Dr. Liaqat Ali

Your instructor for CMPT 120 this semester.

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Meet Your TAs

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What is CMPT 120?

CMPT 120 is:

"An *elementary introduction* to **computing science** and **computer programming**, suitable for students with *little* or *no programming* background."

Today's Topics

1. What is Computing Science?
2. Learning a New Language.
3. Algorithm
4. One-Stop Access To Course Information

Today's Topics

1

What is Computing Science?

What is Computing Science?

Before we find answer to this question, let's watch this video…

What is Computer Science?

1. As you watch and listen, write each definition, in your own words.
2. In pairs, **construct** your **own definition** of Computing Science. (5 minutes)
3. **Add** your definition on the **Discussions** forum on **Canvas**.

Computing Science Is…

Problem solving,

using programming languages

1. As a Computer Scientist, you should **know** what the **programming languages** are.
2. You should also **learn** the programming languages.

So, **computer scientists** are all about solving problems. They use computers to automate solutions to problems and to do things faster and more accurately than we can do by hand or manually.

Check Your Understanding - 1

intro-2-1: What is the most important skill for a computer scientist?

- (A) To think like a computer.
- (B) To be able to write code really well.
- (C) To be able to solve problems.
- (D) To be really good at math.

Today's Topics

2

Learning a New Language

What Are Programming Languages?

Python, C++, JavaScript, etc. are all names of programming languages.

Just like English, Japanese, Spanish, and so on, they are used to communicate instructions to the computers, and

have different grammars, syntax and vocabulary to do it.

Learning a New Language

Learning a new language, like Python, is 4-step process.

Design an Algorithm

Learn how to design solutions to problems by explaining ideas step-by-step

Write it in Python

Learn how to communicate your solution in a language that a machine understands

Test and Deploy

Make sure it works by testing your application

Change the World

Code is the new electricity. Change the world with what you've built.

In This Class…

We will design our algorithms in English, and translate them into the Python programming language.

This will allow us to communicate with computers to solve our problem.

So, from the 4-steps process, we will be using 2 components:

1. **Algorithms** - A Way of *Thinking*
2. **Programming / Writing Code** - A Way of *Communicating*

Today's Topics

3

Algorithm

What is Algorithm? Read, Review in Pairs, and Write

Read the following about Algorithm:

If **problem solving** is a central part of computer science, then the **solutions** that you create through the problem solving process are also important.

In computer science, we refer to these solutions as **algorithms**. An algorithm is a step by step list of instructions that if followed exactly will solve the problem under consideration.

Our goal in computer science is to take a problem and develop an algorithm that can serve as a general solution. Once we have such a solution, we can use our computer to automate the execution.

So, **programming** is a skill that allows a computer scientist to take an algorithm and **represent** it in a notation (**a program**) that can be **followed by** a computer. These programs are written in **programming languages**, like Python.

What is Algorithm?

Describe Algorithm in your own words, and add this description on the Discussions forum on the Canvas (later today).

- Your description must be different from the one provided on the slides.

What is Algorithm?

A list of steps to *complete* a *task* under consideration.

- Algorithms are like **recipes**:
  - they must be followed exactly, they must be clear and unambiguous, and they must end.
  - they have ingredients as **input** and have steps to produce an **output**, i.e. cookies. (**Many different recipes can achieve a similar result.**)
- **If** you can write clear, step-by-step instructions (e.g. to build a chair), you've got great potential in being a computing scientist.
- You may want to make instructions to do it fast, or idiot-proof, or minimize the space needed, etc.

Check Your Understanding - 2

intro-2-2: An algorithm is:

- (A) A solution to a problem that can be solved by a computer.
- (B) A step by step list of instructions that if followed exactly will solve the problem under consideration.
- (C) A series of instructions implemented in a programming language.
- (D) A special kind of notation used by computer scientists.

Write Algorithms

In a nutshell, algorithms answers "how".

- **Say computer knows how to add, multiply, divide or subtract numbers.**
- And, we can write instructions, such as:
  - **Let, X is an integer.**
  - **Let, Y is an integer.**
  - **Let, SUM is an integer.**
  - **Add X and Y giving SUM.**

1. Write an algorithm to calculate **perimeter** of a rectangle.
2. Write an algorithm to calculate **area of a square**.

Optional Readings

- *These readings and videos are optional, introductory, for your interest*
- Students' use of laptops in class lowers grades. Canadian study (Links to an external site.)Links to an external site.
- Big Picture of Computing Systems as layers: Chapter 1, Computer Science Illuminated, by N. Dale and J. Lewis, Jones and Bartlett publishers, 2007. *[This book and in particular this chapter are available at the library on reserves]*
- Sections 1.1 and 1.2 in "Starting out with Programming Logic and Design", by T. Gaddis, 2016 [*This book will be available at the library on reserves.*] Gaddis-ch1-pp1--20.pdf

Today's Topics

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One-Stop Access To Course Information

One-Stop Access To Course Information

Go to the **course website**, on
http://www2.cs.sfu.ca/CourseCentral/120/liaqata/WebSite/index.html,
for a **one-stop access** to the following course information.

- Course Outline
- Exam Schedule
- Python Info
- Lab/Tutorial Info
- Learning Outcomes
- Office Hours
- Textbook links
- CourSys/Canvas link
- Grading Scheme
- i-clicker Info
- Assignments
- and more…

Questions?