SFU SIMON FRASER UNIVERSITY
ENGAGING THE WORLD

CMPT 120: Introduction to Computing Science and Programming 1

Algorithms, Flowcharts and Pseudocodes

python™

One-Stop Access To Course Information

- **Course website**: One-stop access to all course information.

http://www2.cs.sfu.ca/CourseCentral/120/liaqata/WebSite/index.html

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

- **Canvas**: Discussions forum.

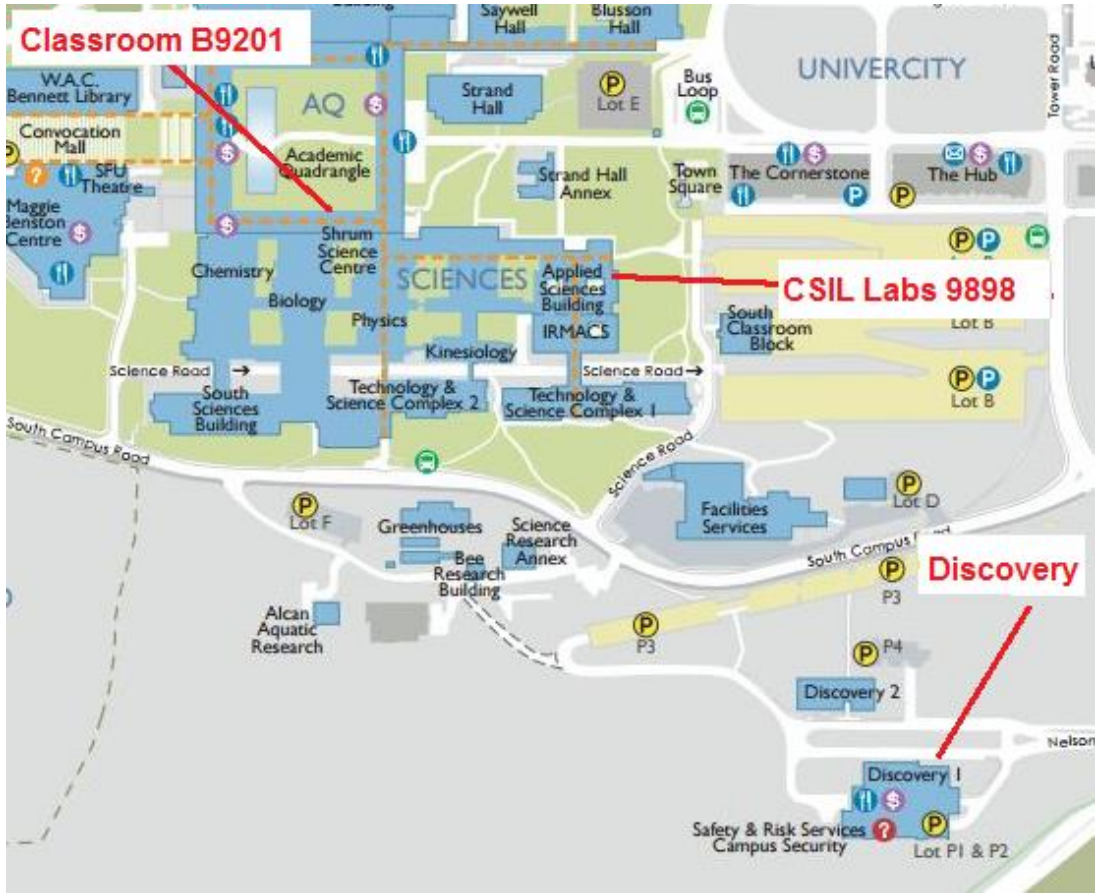
  https://canvas.sfu.ca/courses/39187

- **CourSys**: For assignments submission, and grades.

  www.coursys.sfu.ca

Some Reminders

- Get familiar with the course Website.
  - http://www2.cs.sfu.ca/CourseCentral/120/liaqata/WebSite/index.html
  - Minor updates may occur during first week.
- Get fob to access LABS **(start next week!)**
  - If you don't have it already, get a new fob from Discovery Park 1 .



Additional Resources / Online References

- There are several online references that are **as important as the texts**. (Links provided on the course web site.)
- These resources are **very important to your success** in this course. They aren't meant to be read from beginning to end like the readings in the textbook.
- You should **use them** **to get an overall picture of the topic** and as references as you do the assignments.

How to Learn in This Course?

Today's Topics

1

Algorithms.

Algorithm: Its Definition and Key Properties - 1

- During the last lecture, we talked about algorithms.
- Now, let's have a look at a couple of more definitions.

> An algorithm is a sequence of unambiguous instructions for solving a problem, i.e., for obtaining a required output for any legitimate input in a finite amount of time.

[Source: CMPT 120 Study Guide; Anany Levitin, Introduction to The Design & Analysis of Algorithms, p. 3]

Algorithm: Its Definition and Key Properties - 2

- An algorithm is any well-defined computational procedure that takes some value, or set of values, as input and produces some value, or set of values, as output.
- _____.

[Source: Thomas H. Cormen, Chales E. Leiserson (2009), Introduction to Algorithms 3rd edition.]

Algorithm: Key Properties

- **Unambiguous**: Each step of an algorithm has to be precisely defined.
  - **After reading an algorithm, there should be no question about what to do.**
- **Specific problem**: An algorithm should always present a solution to a particular problem, or group of problems.
- **Legitimate input**: An algorithm might need some kind of input to do its job. This input should be relevant.
- **Finite amount of time**: If started, an algorithm must end eventually. If it never ends, it's useless.
- **Clear I/O**: Inputs and outputs should be defined clearly.
- **Effective**: Should be effective among many different ways to solve a problem.

Algorithm: Watch A Video

- Let's watch this short video about algorithms.
- You will hear two new terms related to algorithms in this video. Let's see if you can note them down.
  - What's an algorithm?_____

Algorithm: The Two New Terminologies

1. _____

2. _____.

- We will talk about these terms later. Let's do some examples of algorithms.

Algorithm: Add Two Numbers Entered by a User

Step 1: **Start**

Algorithm: Verify the Properties

Step 1: Start

1. Is it Unambiguous?
2. Solves specific problem?
3. Legitimate input?
4. Finite time?
5. Clear I/O?
6. Is it effective?

Algorithm: A Few Computing Science Terminologies

- In Computing Science, we usually don't write "**suppose**". Rather, we typically say "**declare**".
- We call N1, N2, and SUM as "**variables**".
  - And, variables typically "**store**" values.

So, We may choose to re-write the step: Suppose, N1 is the first number.

As: **Declare a variable N1.**

Or, **Declare a variable N1 to store the value of first number.**

Or, **Declare a variable N1 to store the value of the first number entered by the user.**

Re-Write the Add Two Numbers Algorithm

Re-write the following "add two numbers algorithm" replacing the words declare, variable and store, as necessary.

Algorithm: Find the Smaller of Two Numbers

Write an algorithm to find the smaller of two numbers entered by a user.

Step 1: Start

Algorithm: Find the Smallest of Three Numbers

- Write an algorithm to find the smallest of three numbers entered by a user.

- Solution in the next class.

Questions?