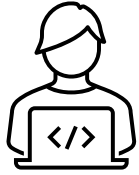# BIOE40002 – Computer Fundamentals and Programming 1

Part II – Programming 1, Lab 1

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Lab Sessions Guides

- **Time:** Thursdays 11pm – 1am, from week 8 to 11. Registration required.

- **Lab structure:** Python (3 sessions) + Arduino (1 session)

- **Your tasks:**
  - Follow the lab worksheet, familiarize yourself with the programming skills and be able to transfer the skills to facilitate your future work.

- **What are available to you?**
  - Key resources on BlackBoard: *(1) Lab book (2) course slides*
  - Me ☺
 - StackOverflow and resources available on Internet
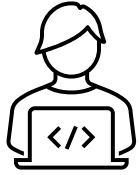
Lab Sessions Guides

- **My structure:**
  - Memes / interesting Python projects demo / background knowledge
  - Recap to the key info for the lab session
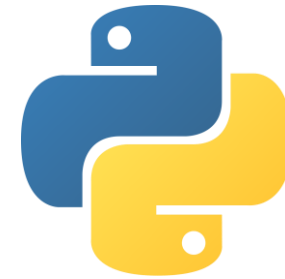 - Lab work + Q&A
  - Summary
- *Do*s and *Don't*s
  - *DO* ask questions! Unmute yourself and show us your code.
  - *DO* show your logic, *DO NOT* ask "why this does not work"
  - *DO* Think independently. Always ask yourself why first.
  - *DO* take your own time for coding, *DO NOT* rush through the tasks.
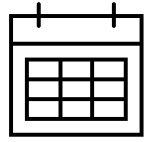
📅 Today's Schedule

- Recap (~ 10 mins)
  - *Why* Python ?

- Lab 1
  - "Hello, World !"
 - Syntax
  - Variables
  - Flow control

Why Python?

- Programming is a way to instruct the computer to perform various tasks.

- Python is…
  - a *high-level* general-purpose programming language
  - a 'friendly' and efficient language for coders
  - a powerful tool for various uses

- Python has the largest developer **ecosystem** among all languages.

Usage	Related modules
Machine learning	PyTorch, TensorFlow, Karas
Scientific Computing	NumPy, SciPy, SimPy
Data science	NumPy, Pandas, Matplotlib
Web Development	Django, Flask
App Development	tkinter, PyQt
Game Development	Archade, PyGame

Front-end languages
JavaScript 69% / 4%	HTML / CSS 60% / 2%
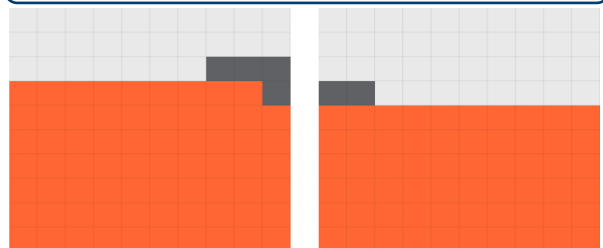
Database
SQL 54% / 3%
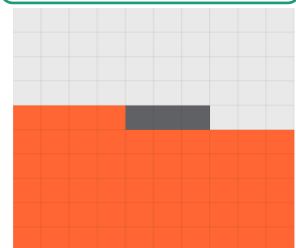
General-purpose languages
Python 52% / 8%	Java 49% / 4%

https://www.jetbrains.com/lp/devecosystem-2021/

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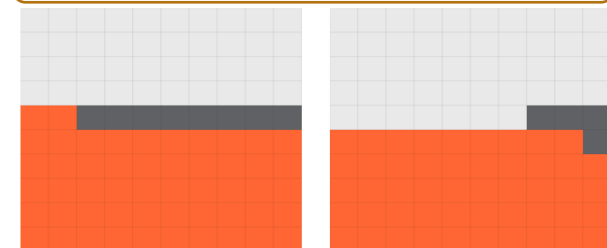
Why Python ?

Matrices	Python Language	C Language
Purpose	General purpose programming language	Mainly used for hardware related applications
Execution	Interpreted language	Compiled language
Speed	Slower	Faster
Programming paradigm	Support object-oriented programming	Imperative programming
Learning cost	Easy to learn, read and write ☺	More complex syntax ☹
Other features	Large number of build-in functions	Limited number of build-in functions
	No need to declare variable type	Need to declare variable type
	No pointers functionality	Support pointers
Examples	YouTube, Instagram, Spotify	MATLAB(partially), Git, GCC

https://www.educba.com/c-vs-python/

Have you installed Python IDLE on your PC?

Syntax

1. Be careful with indentations
    - Indentation: space at the beginning of a code line
    - Python uses indentation to indicate the **block of code**
    - Within one block, you need at least one space.
    - The number of space has to be the same in one block.

2. Comment
    - In Python, comments start with a hashtag, **#**
    - Comments are ignored by the interpreter
    - Help you and others to understand the code… use it!

3. Naming rules:
    - Using reasonable names

Correct syntax

```
for i in range (0,10):
    print(i)
```

Syntax error

```
for i in range (0,10):
print(i)
```

```
for i in range (0,10):
    print("i equals to")
        print(i)
```

Comment

```
# print out the text
print("Hello, World!")
```
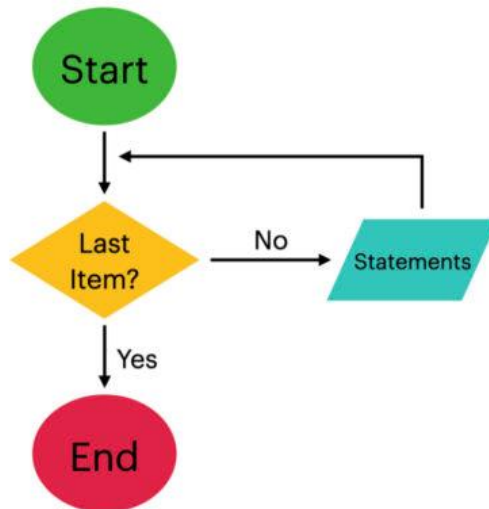
Variables

- Integer: `a = 4`
- Float: `b = 3.33`
- String: `name = "Webster"`
- List: `lst1 = [1, 2.2, "Webster"]`
- Dictionary: {"name": "Webster",

  "age": 20,

  "gender": "M"}
- Tuple…

Flow control

- **for** loop

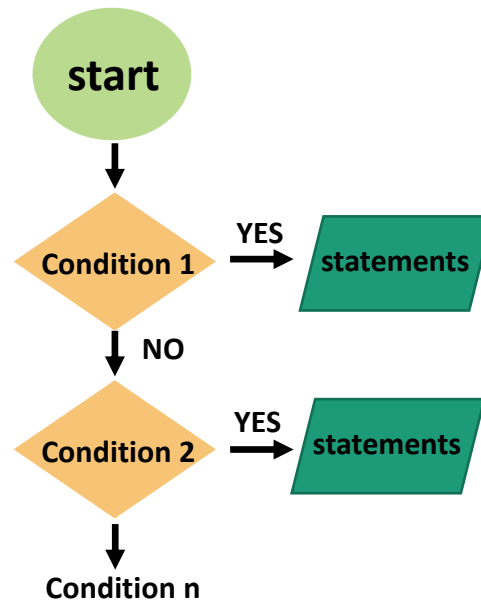 *"If your medical science exam mark is lower than 40, resit the exam ! "*

- **if**... **else**... statement

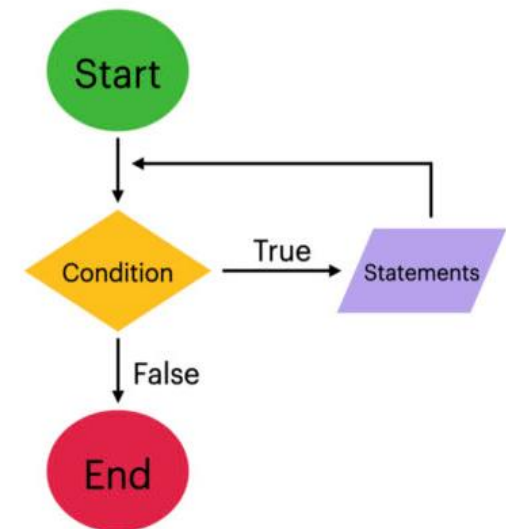 *"If you see a someone in bioengineering, say hi. Otherwise, ignore him/her."*

- **while**... condition

  "Stay on your mechanics coursework until you dead."

For Loop

If... else... statements

While Loop

That's it for now.

You can now proceed to the Exercises.