

Introduction to Programming with Python

Learn how to program and create logic structures
with Python.

Hello Everyone

Course Schedule

- **Week 1:** Variables & Syntax
- **Week 2:** Flow Controls & Loops
- **Week 3:** Arrays, Lists & Dictionaries
- **Week 4:** Strings, Characters & Files
- **Week 5:** Working with Arrays
- **Week 6:** Introduction to Spreadsheets
- **Week 7:** Mathematics & Python
- **Week 8:** Web Scraping & Python

Learning Outcomes

What will you gain through this course:

- Practical and Applied knowledge of Python programming
- Understanding of CS theory and basic computer architecture
- Logic skills
- Problem Solving skills

Let us begin...

Variables & Syntax

Welcome to the world of Python!

What is a variable?

A Variable is a chunk of storage.

We name a location in computer memory (RAM) and then give it a value.

How to do that:

A = 1

B = 'b'

In programming the “=” means “append” and not “equals”!

How to properly define variables

- Never start with a number
- Never use spaces
- Only use letters, numbers and, some special characters

Recommended Formatting

name

variable_name

variableName

Basic Data Types

- Integers (Int)
- Floating Point Numbers (float)
- Complex Numbers (complex)
- Strings
- Characters (Char)
- Boolean

Integers

The Integer data type, is self evident. It stores Integer numbers (e.g. “2”).

How to Declare:

```
var_name = 2
```

Logic Operations:

- Addition: $\text{Number} + 2 \rightarrow 4$
- Subtraction: $\text{Number} - 2 \rightarrow 0$
- Multiplication: $\text{Number} * 10 \rightarrow 20$
- Division: $\text{Number}/2 \rightarrow 1$

Floating Point Numbers

Otherwise called “float”, this data type can hold decimal numbers.

How to Declare:

```
var_name = 2.4
```

Logic Operations:

Same as with Integers.

Complex Numbers

From mathematics we know Complex Number which exist in the Complex plane.

How to define:

```
var_name = 2+3j
```

We don't use these! No need to learn the details.

Strings

A String is a “line of text” i.e. is multiple joint *Unicode* characters.

How to define:

```
var_name = “hello world”
```

Operations:

We will cover this in Week 4

Character

A Character or “Char” is a single *Unicode* character.

How to define:

```
var_name = 'a'
```

Operations:

We will cover these in Week 4

Clarifications

What is Unicode?

Unicode is an industry standard for text encoding, representation and handling. For Latin Script we use Unicode U+0020 to U+007E.

Important difference between Char and String.

Multiple Characters make up a string. When declaring a String we use “ ”
When we declare Char we use ‘ ’

Boolean

A Boolean or Bool statement is a binary switch that takes a value of either 0 or 1.

How to define:

```
var_name = None
```

Operations:

AND

OR

NOT

Console Output

We have a variable. We want to see it. How?

Simple: `print(variable_name)`

Example:

```
a = 5
```

```
a = 5 + 5
```

```
Print(a)
```

Arithmetic Operations

$A > B \rightarrow$ “A larger than B”

$A < B \rightarrow$ “A smaller than B”

$A == B \rightarrow$ “A equal to B”

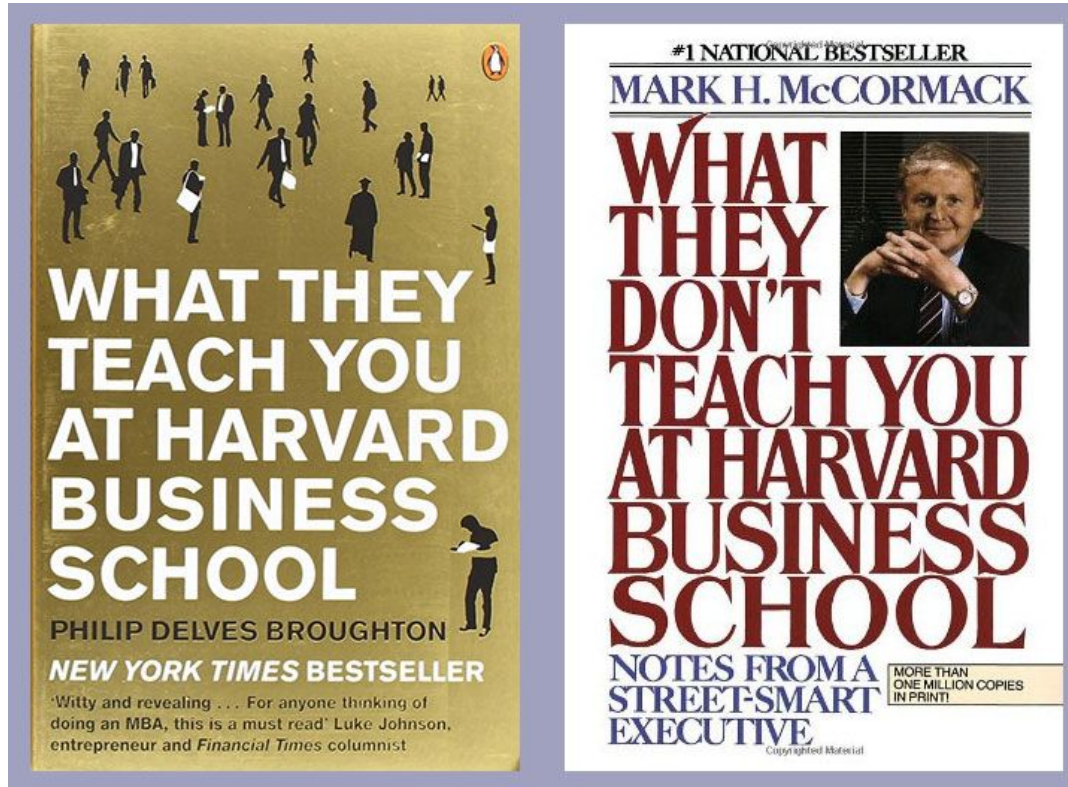
$A <= B \rightarrow$ “A smaller or equal to B”

$A != B \rightarrow$ “A not equal to B”

Remember these!

Set Theory

The sum total of human knowledge



Boolean Operators

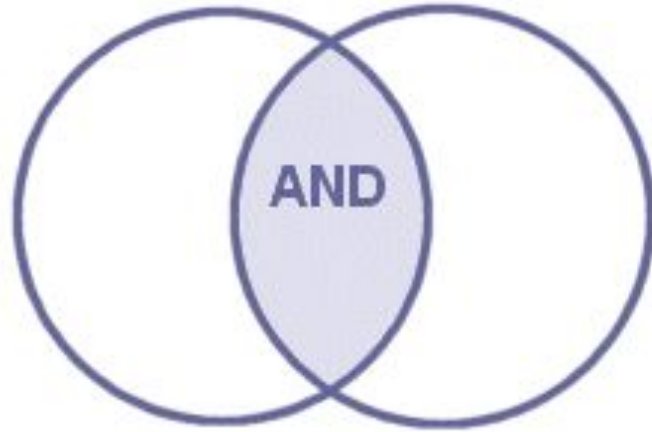
Boolean Operators are statements that give us a statement about the relationship between two sets. There are three main Boolean Operators:

AND

OR

NOT

“AND” Operator



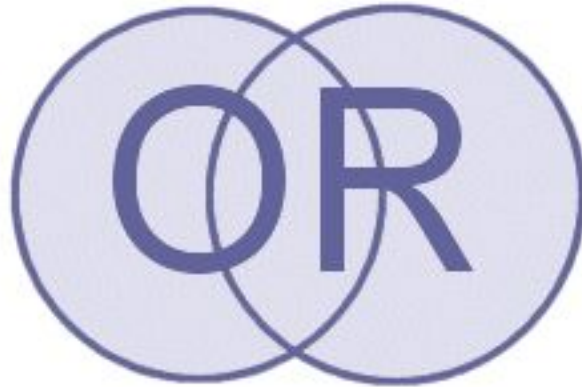
“AND” operator outputs the common elements between two sets. Consider the following:

A = 1

B = 1

A == 1 AND B == 1

“OR” Operator



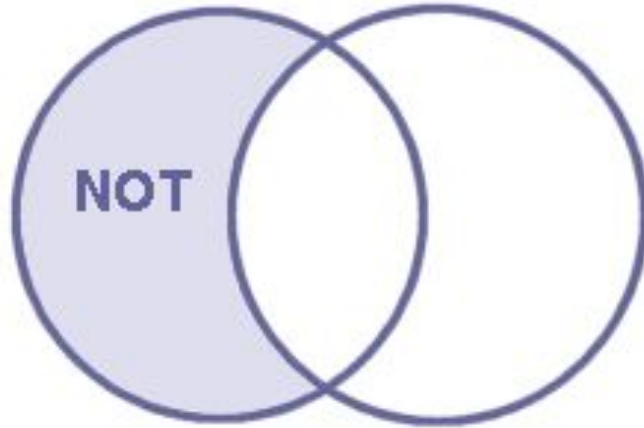
“OR” is the union of the two sets. Either of the two statements needs to be true. Consider:

$$A = 1$$

$$B = 2$$

$$B == 2 \text{ or } A > B$$

“NOT” Operator



“NOT” is the opposite of the set/value. Consider:

$A = 1$

$A == 1$

$\text{NOT}(A == 1)$

How to write these in Python

- AND \rightarrow `a & b`
- OR \rightarrow `a or b`
- NOT \rightarrow `not(a)`

A and B need to be Boolean variables

User Input

How can we Interface with the computer? Type in our own values for an operation?

Simple: *variable_name = input()*

Expanded Example:

```
Inp = input("Enter a number: ")
```

Note that in Python 3 the *input* function parses arguments as String type. Thus to get a desired data type (e.g. Int) we have to declare a conversion.

```
Inp = Int(input("Enter a number:"))
```

Exercise 1

Level: Simple

Create a program through which you can add two integer numbers.

Use IDLE for this!!

Allowed Time: 10 minutes.

Exercise 2

Level: Intermediate

Create a program that will compare two input number and see which one is larger, or if they are equal.

Allowed Time: 15 minutes