Python Programming Workshop - IT@JCU

Welcome to this introductory workshop, jumping straight in to programming in Python!

Run PyCharm

Click Create New Project

Enter your name as the project name

Leave the default directory unchanged

Make sure that Interpreter points to a Python 3 installation (e.g. C:\Python3x… not C:\Python2x…).

Launch the Python console by selecting **Run Python Console** from the Tools menu.

One of the really neat things about Python is the ability to use the interpreter to write one-line 'programs', so let's try a few…

Enter each of the following at the prompt (>>>) and see what happens when you press Enter after each one: (replace yournamehere with your own name!)

```
x = 5
x = x + 1
print(x)
name = "yournamehere"
name
print("name")
print(name)
print(Name)
```

(The last one should give you an error because of the capital N in Name. We just want you to see it.) If you have any problems that you can't figure out with these, talk to the person next to you.

Click in the project window (top-left) then create a new Python file called first.py.

Type the following code in this new window:

```
firstName = input("Enter your first name: ")
lastName = input("Enter your last name: ")
print("Hello", firstName, lastName)
```

Now run it by choosing Run from the Run menu, or you can click on the green run button (looks like a normal triangle play button) or use the shortcut **Shift+F10**.

The output should appear in the Console window at the bottom where you can enter your inputs.

If you get any errors, read the error message(s) and try and fix them.

Pseudocode

Coding should really be a "translation" step - i.e. converting a well-planned solution, usually written in pseudocode, into code in a programming language.

Here's an example of pseudocode that calculates the area of rectangle, given its width and height.

```
get width
get height
area = width * height
display area
```

And below, we have some sample of what the output should look like:

Please enter the width: **10**
Please enter the height: **5.53**
The area is: **55.3**

Okay, so we need to write the Python equivalents of "get width" and "get height".

We need to convert them to the right type, which will often be **int** (whole numbers) or **float** (numbers with a decimal place). In this case, the width and height will be floats.

```
width = float(input("Please enter the width: "))
height = float(input("Please enter the height: "))
```

We can write the calculation **exactly** the same way as the pseudocode.

```
area = width * height
```

To display output in Python, we use the **print** function:

```
print("The output is:", area)
```

Putting it all together, we have:

```
width = float(input("Please enter the width: "))
height = float(input("Please enter the height: "))
area = width * height
print("The output is:", area)
```

House Price Calculator

Use the sample output and pseudocode below and implement your solution in Python code.
Create a new file called **houseprice.py** and write your code.

Sample Output

What is the house size in m2? **20**
What is the price per m2? **3**
The total house price is $**60**

Pseudocode

get houseSize
get pricePerM2
houseCost = houseSize * pricePerM2
display houseCost

Test it and adjust if necessary.
Make sure when you test it that you use numbers that you know the answer for, so you know if the computer (your program) got it right.

Random Numbers

Make a new file called random.py and enter:

```
from random import randint

result = randint(1, 11)
print(result)
```

This imports the random module then prints a random number between 1 and 10 inclusive (10 is 11-1).

Now write code to ask the user for the maximum value, store this in a variable, then print a random number up to that maximum.

Loops

Python has both `while` and `for` loops. The 'body' of the loop (the part that repeats) must be indented. Type the following code in your program and run it:

```
for i in range(6):
    print("Number", i)
```

This loops 6 times - from 0 through to 5, with the variable i being updated each time.

Now try a while loop:

```
name = input("What is your name? ")
while name != "":
    print("Hello", name)
    name = input("What is your name? ")
```

This loops **while** the name is not blank… it loops **until** the user enters a blank name (just presses Enter).

The condition (in this case, `name != ""`) can be anything that evaluates to true or false, including using Boolean logic (and, or, not). Update your code so it checks for a blank name **or** your own name:

```
while name != "" or name != "yourownname":
```

OK, now you should have seen enough to try a challenge. Work with the person next to you to solve this problem… (The solution is at the end of this document if you need to look it up or want to check it.

- Ask the user for their age (remember to store the input as an int).
- **While** the user's age is invalid (outside the range 0-99), print "I think you're not telling the truth" and ask for the age again.
- Then print all the birthdays they've had - e.g. if they are 4, it should show 0 1 2 3 4
  (Hint: use a for loop and the range function.)

To print output on the same line, you can use the end=" " parameter in print, like:

```
print(year, end=" ")
```

If… Else

Now we need to be able to ask questions and choose to do one thing or another, with `if` and `else`.

What does the following code do? Read it and figure it out, then enter it into your program and test it.

```
age = int(input("Age: "))
if age < 18:
    print("Minor")
else:
    print("Adult")
```

Keep going…

Guessing Game

Now we will use all that we have learned to write a program to make the computer guess your number…

Write code to:

- Create a variable to count the number of guesses, set to 0
- Ask the user for their number (int) between 1 and 20.
- Generate a random number between 1 and 20 as the guess.
- Print this guess
- While the random number is different from the user's number:
    - add one to the count
    - Guess (generate) and print again
- (When the numbers are the same), print "Got it in <count> guesses!"
  (where <count> is the variable for the number of guesses)

You can print text and variables in the same line like:

```
print("Got it in", count, "guesses!")
```

The output should look something like this (user chose 6):

```
Enter your number: 6
I guess 11
I guess 16
I guess 13
I guess 18
I guess 11
I guess 4
I guess 5
I guess 6
Got it in 8 guesses!
```

Solutions

Random up to maximum:

```
maximum = int(input("Max: "))
print(randint(1, maximum + 1))
```

Age and list of birthdays:

```
age = int(input("How old are you? "))
while age < 0 or age > 99:
    print("I think you're not telling the truth")
    age = int(input("How old are you? "))
print("You have had these birthdays:")
for year in range(age + 1):
    print(year, end=" ")
```

Guessing game:

```
secret = int(input("Enter your number: "))
count = 0
guess = randint(1, 20)
print("I guess", guess)
while guess != secret:
    count = count + 1
    guess = randint(1, 20)
    print("I guess", guess)
print("Got it in", count, "guesses!")
```