INTRODUCTION TO PYTHON

LECTURE 1: Hello world

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3/29/2019

INTRODUCTION TO PYTHON. LEC:1



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This course

Fast paced intro into Python

Geared towards Electrical engineering usage

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Quick poll

Do you know C or C++?

Have you used Matlab?

Have you used Python?

Are you interested in:

- HW engineering?
- Data-analysis?
- Software engineering?

Electrical Engineering

Example: radio transceiver design.

- Circuit design.
- Underlying physics.
- Manufacturing process technology.
- Measurements.
- And coding on top of that!!

What do we use coding for?

- Optimization problems.
- System modelling, signal processing.
- Data visualization.
- Embedded engineering (microcontrollers.)
- Debugging and testing (HW and SW).
- Scripting (HW automation.)

Scripting (hardware automation.)



Languages that engineers use

Numerical languages: Matlab, R.

High level programming: C++, C#, Perl.

Low level: C, Assembly.

Hardware: AHDL, VHDL, Verilog

Scripting: Html, xml, yaml.

Word processors: Latex



Growth of major programming languages

Based on Stack Overflow question views in World Bank high-income countries



Trendiest language.

Also open source.

Source: https://stackoverflow.blog/20...



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Python vs. C++

Interpreted vs. compiled

Duck typing vs. explicit types

Automatically managed memory vs. insidious memory bugs

Q: Is Python faster or slower than C?





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Syllabus

Lectures are Mondays from 06:30 – 08:00 in EER 1.516

Lab sessions are at 6:30 – 8:00 on Wednesdays in EER 1.516 or Thursdays in EER 1.516

We will meet for a total of seven weeks

3 problem sets and one final project.

To pass, you need an average >= 60

Assignments are due in a week; Late assignments are penalized by 15 points

Course contents:

- Python basics.
- Object oriented programming.
- Numpy.
- Matplotlib.
- Scripting.

Classroom etiquette

Laptops for python only: Please no other apps or tabs open.

Handwritten notes are healthier for your brain.

Collaboration is encouraged in lab sessions.



Mueller, Pam A., and Daniel M. Oppenheimer. "The pen is mightier than the keyboard: Advantages of longhand over laptop note taking." *Psychological science* 25.6 (2014): 1159-1168.

Installing Python: Python eco-system



Installing Python

Go to: https://www.anaconda.com/

- Download Anaconda distribution.
- Install anaconda.
- From Anaconda navigator: Launch Spyder

ANACONDA.DISTRIBUTION

The Most Popular Python Data Science Distribution

Download Now

Or: <u>https://repl.it/</u>

Cloud-browser based IDE

Spyder environment



Hello, world!

5 MIN BREAK

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Hello world in C++

```
#include <iostream>
```

```
int main(int argc, char ** argv) {
  std::cout << "Hello, world!\n";
  return 0;
}</pre>
```

Hello world in Python



Comments

Single line comment.

11.11.33

Multi

Line

Comment

11 11 11

Variables



Variable (scalar) types

Туре	Description
int	Integer number
float	Floating point number
bool	True or False values
str	String

Arithmetic operators

- + Addition
- Subtraction
- * Multiplication
- / Division (floating point)
- // Division (integer)
- % Modulus
- ** Exponentiation

Operators follow precedence rules: **,*,/,+ -

Boolean operators

- == Equal
- != Not equal
- > Greater than
- >= Greater than or equal
- < Less than
- <= Less than or equal
- not Logical NOT
- and Logical AND
- or Logical OR

Strings

str1 = "Hello"	# => "Hello"	No difference
		botwoon (and "

- str2 = 'Hello' # => "Hello"
- str1 + ', world!' # => "Hello, world!"

Puzzle: How to put quotation marks inside a string?

Querying types (dynamic reference)

x = 1
type(x) # => <class 'int'>
x = 1.0
type(x) # => <class 'float'>
x = "Texas"
type(x) # => <class 'str'>

Type conversion	
int (9.25)	# => 9
str(9.25)	# => "9.25"
float(9)	# => 9.0
bool (9.25)	# => True
int ("9")	# => 9
int("9.25")	# => ValueError
int (float("9.25"))	# => 9

Input/output

Input:

o input("State: ")

Output:

o print("Texas")

Apparatus of programming



If statements

if cond1:
 print("cond1 was True")
else:
 print("cond1 was False",)but cond2 was True")
else:

print("cond1 and cond2 were False")

Summary

Today:

- Python eco-system.
- Syntax basics.
- Numericals.
- Boolean and conditionals

Next week:

- Loops.
- Strings.
- Data types.