

INTRODUCTION TO PYTHON

LECTURE 1: Hello world

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This course

Fast paced intro into Python

Geared towards Electrical engineering usage

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

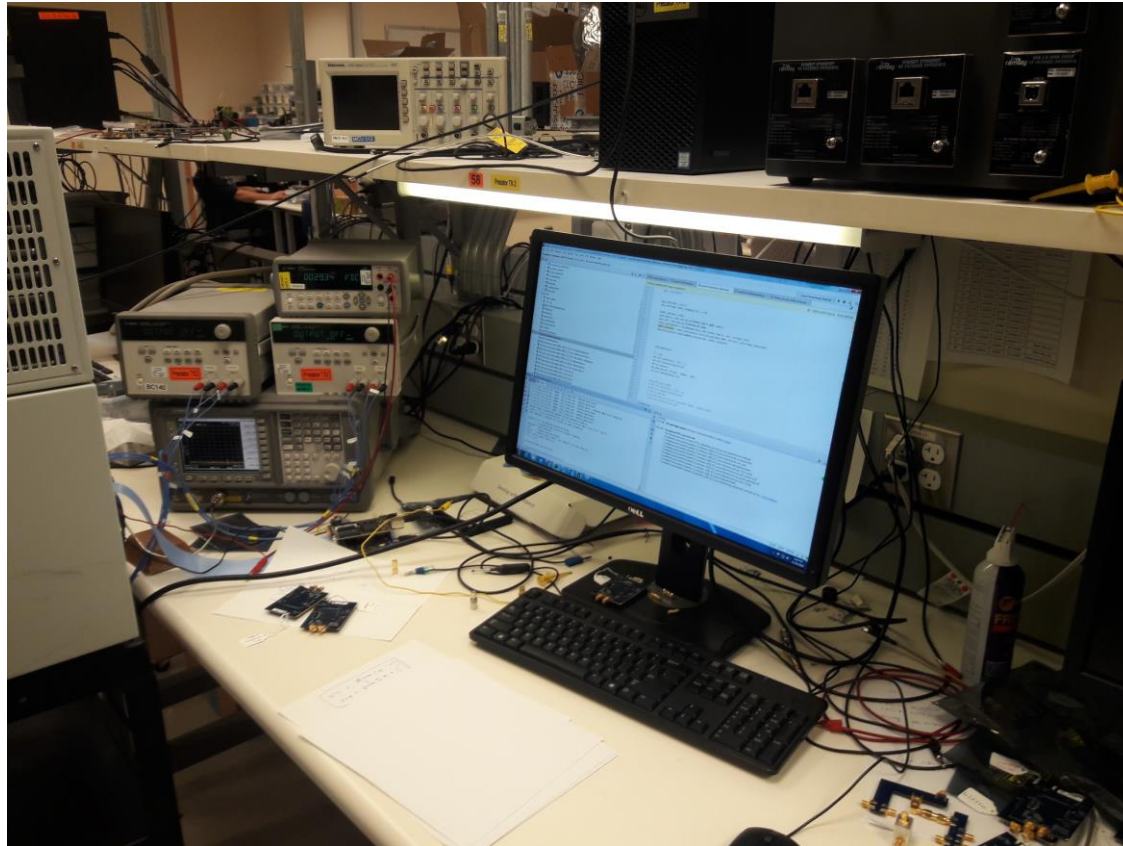
Example: radio transceiver design.

- 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.

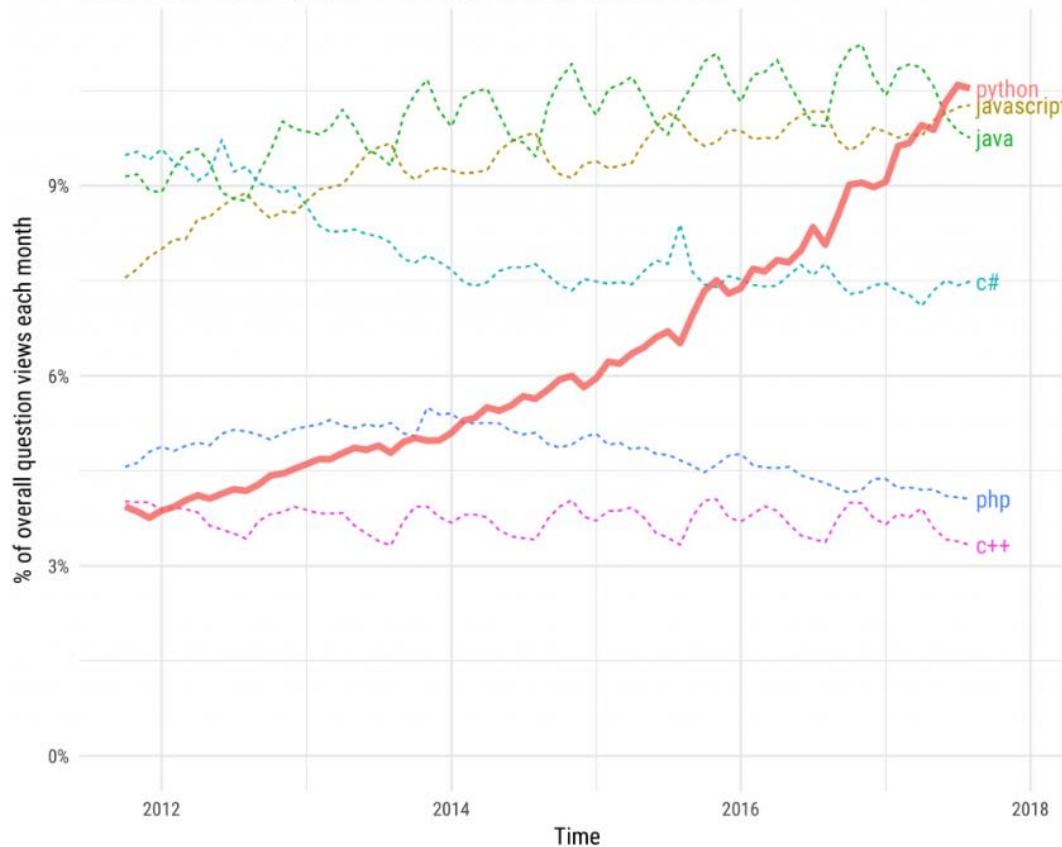
Hardware: AHDL, VHDL, Verilog

Scripting: Html, xml, yaml.

Word processors: Latex

Growth of major programming languages

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

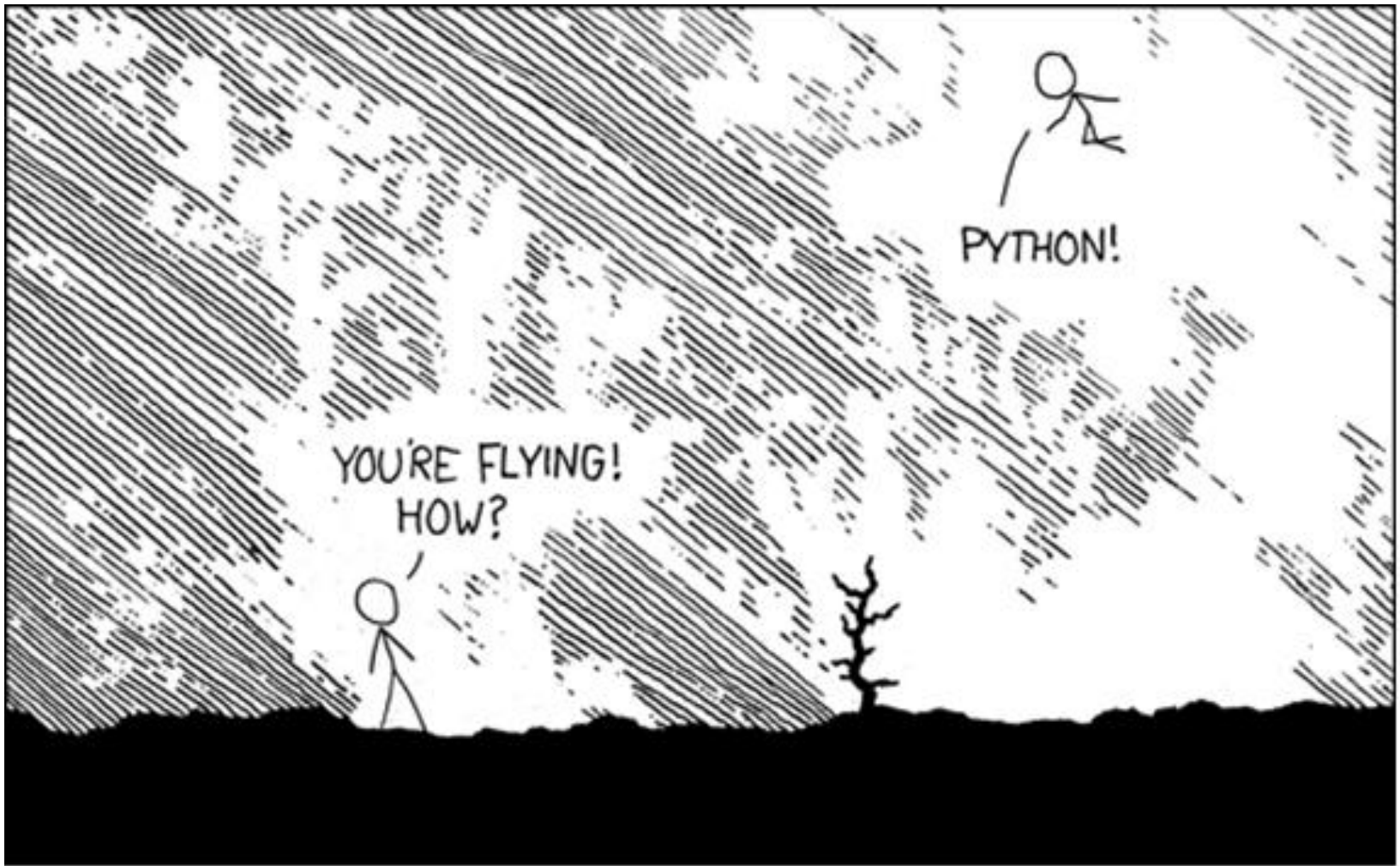


Source: <https://stackoverflow.blog/20...>



Trendiest language.

Also open source.



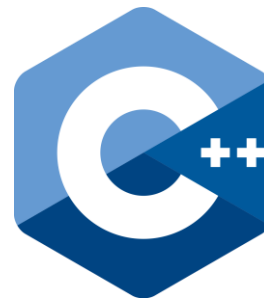
Python vs. C++

Interpreted vs. compiled

Duck typing vs. explicit types

Automatically managed memory vs. insidious memory bugs

Q: Is Python faster or slower than C?



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:

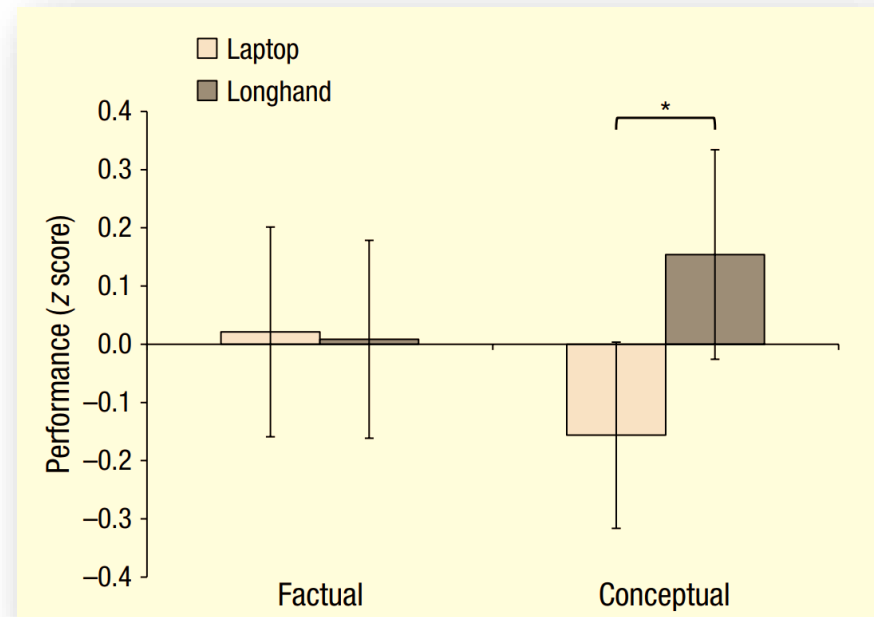
- Python basics.
- Object oriented programming.
- Numpy.
- Matplotlib.
- Scripting.

Classroom etiquette

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

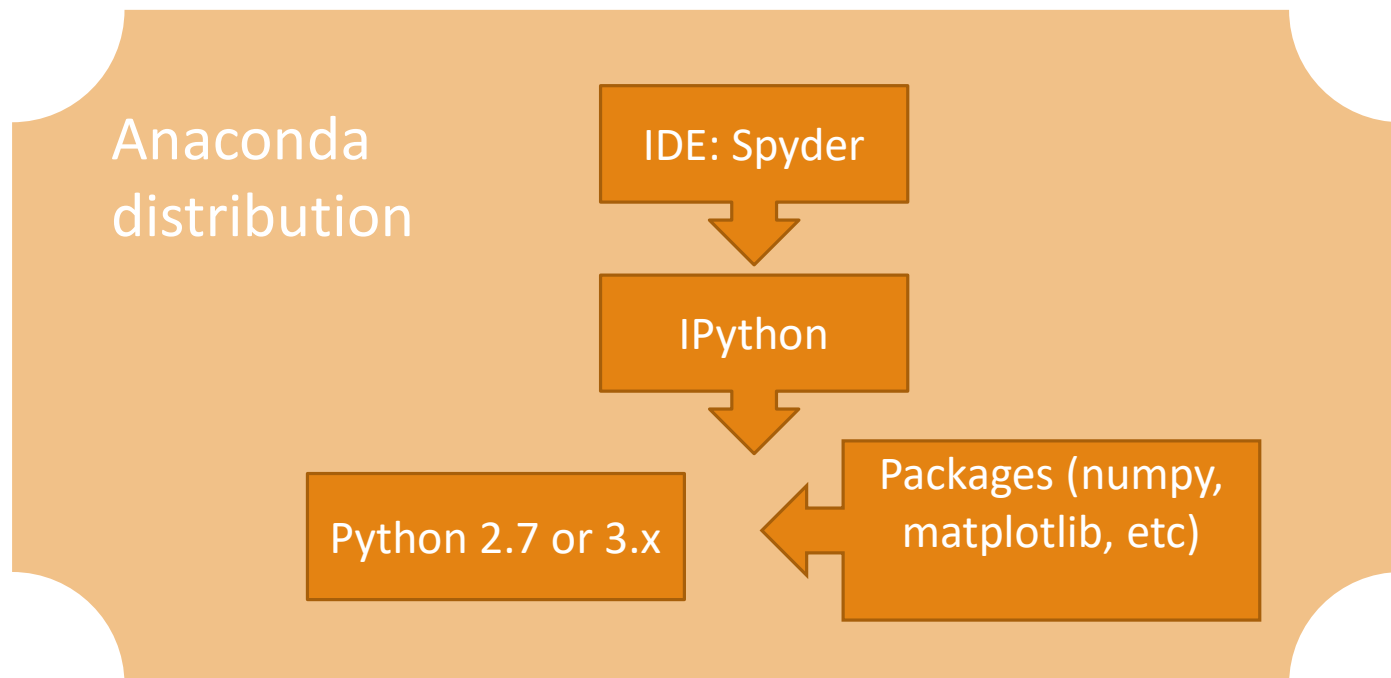
Handwritten notes are
healthier for your brain.

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



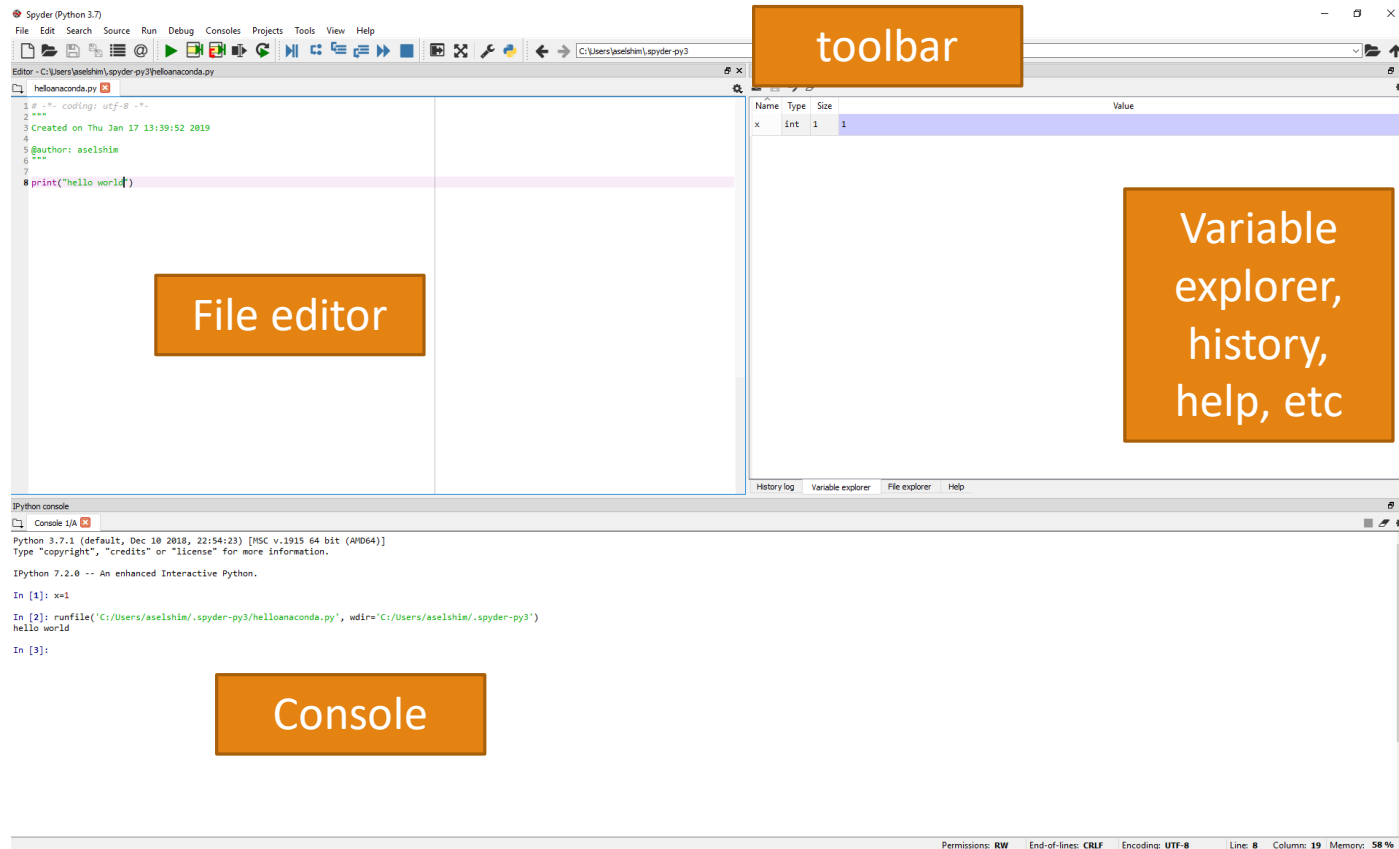
The Most Popular Python Data
Science Distribution

Download Now

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

Cloud-browser based IDE

Spyder environment



Hello, world!

5 MIN BREAK

Hello world in C++

```
#include <iostream>

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

Hello world in Python

```
print("Hello, world!")
```



No semicolon

Comments

```
# Single line comment.
```

```
"""
```

```
Multi
```


```
Line
```

```
Comment
```

```
"""
```

Variables

No variable type
declaration



```
pi = 3.14159
radius = 2.2
# area of circle equation
area = pi*(radius**2)
print(area)
```

Variable (scalar) types

Type	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

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

Strings

```
str1 = "Hello"
```

```
str2 = 'Hello'
```

```
# => "Hello"
```

```
# => "Hello"
```

No difference
between ' and "



```
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

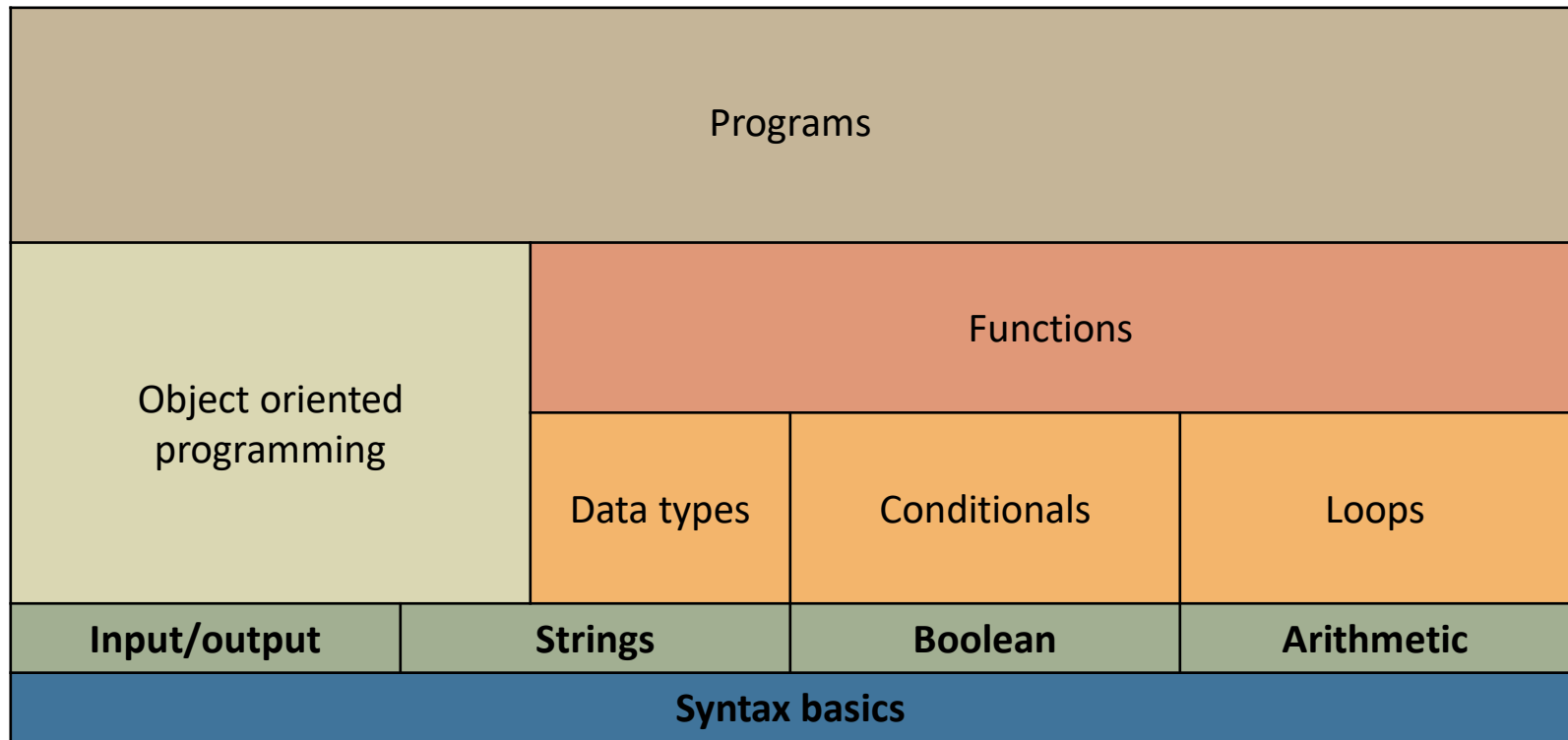
Input:

- `input("State: ")`

Output:

- `print("Texas")`

Apparatus of programming



If statements

```
if cond1:
    print("cond1 was True")
elif cond2:
    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.

Lab sessions this week

Lecture review.

Q&A.

Ungraded quiz.