

PROGRAMMING LANGUAGES

An Introduction to Computer Science



Let's learn about programming languages.

What is a Programming Language



```
OPEN THE FILE  
INITIALIZE THE SUM  
READ EACH LINE OF THE FILE  
FOR EACH LINE,  
    ADD IT TO THE SUM  
PRINT THE RESULT
```



Programs are created by writing programs in a programming language.
Programming languages were created by people to give computers clear instructions.

Python and its Competition



In this course, you are learning a programming language named Python. However, there are many programming languages out there.

Why Python?

Popular

Useful

Friendly

2019 Most Popular Programming Languages

Rank	Language
1	Java
2	C
3	Python
4	C++
5	Visual Basic .NET

Use Cases

Application Area
Scientific Computing
Web Server
Data Science
Game Development
Scripting Language

<https://www.tiobe.com/tiobe-index/>

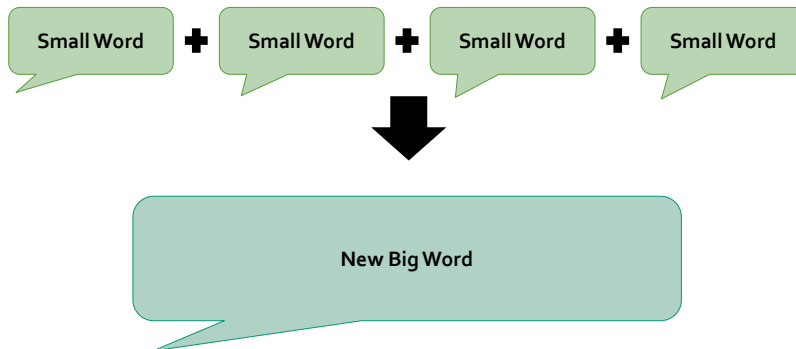
You might be wondering why Python is a good language to learn, if there are so many options.

First, Python is one of the most popular languages in the world.

Second, it has a huge number of libraries that make it useful for a wide range of problems.

Third, it is a friendly language for beginners.

A Small Language



Imagine you were giving commands to a very small child in English.

The child only knows a few words.

If they don't know a word, you will have to explain it to them using words they already understand.

Programming Languages are similar to this - you build new words using a small set of original words.

Commands

Go to the market.
Get me eggs and milk.
Then return home.

Don't tell me
what to do!



Human languages, like English, can be used to talk about many complex ideas. However, programming languages are good for only one thing: giving instructions to a computer.

We don't use programming languages to talk to each other the same way we do human languages.

Rules

Syntax

- Grammar
- Spelling
- Punctuation

Semantics

- Logic
- Making sense
- Intent



Programming languages have very strict rules.
This is similar to how we have rules in English.
There are two kinds of rules: syntax and semantics.

Syntax

Capitalization?

"Run can . upways tHe, to heal?!?"

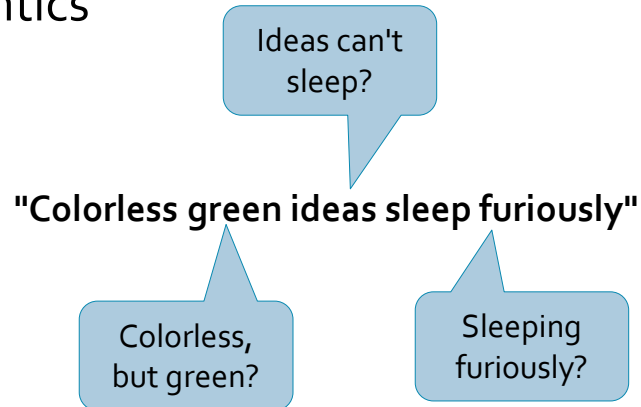
Period?

Spelling?



In English, we follow grammar rules about how we can structure our sentences. The sentence below is not grammatically correct english, so we would reject it. Similarly, in Python, we use symbols, spaces, and words in very precise ways. Using them incorrectly will give you a "syntax error". You will probably make many syntax errors as you learn to program.

Semantics



Although the sentence below follows grammar rules, it doesn't make any sense. This is the idea of semantics.

It is very easy to write perfectly valid sentences in Python that accomplish nothing at best and hurt things at worst.

You need to think when programming, to recognize when you've written something that makes no sense.