

# Python Full Notes: Basics to Advanced (with Definitions & Examples)

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## ♦ 1. Introduction to Python

### Definition:

Python is a **high-level, interpreted, and general-purpose programming language**. It is known for its simplicity and readability.

### Key Features:

- Easy to read/write
- Open-source and free
- Cross-platform (Windows, Mac, Linux)
- Supports multiple paradigms: procedural, object-oriented, functional

### Example:

```
python
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print("Hello, World!")
```

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## ♦ 2. Python Installation and Setup

- Download Python from: <https://www.python.org>
  - Use **IDLE**, **VS Code**, or **PyCharm** for writing and running Python code.
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## ♦ 3. Variables and Data Types

### Definition:

Variables store data. Python is dynamically typed (no need to declare type).

```
python
CopyEdit
name = "Dhanush"
age = 21
pi = 3.14
is_student = True
```

### Data Types:

- `int, float, str, bool, list, tuple, set, dict, NoneType`
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## ♦ 4. Input and Output

```
python
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name = input("Enter your name: ")
print("Hello", name)
```

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## ♦ 5. Operators

- Arithmetic: `+` `-` `*` `/` `%` `//` `**`
  - Comparison: `==` `!=` `>` `<` `>=` `<=`
  - Logical: `and` `or` `not`
  - Assignment: `=` `+=` `-=`
  - Membership: `in`, `not in`
  - Identity: `is`, `is not`
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## ♦ 6. Control Flow Statements

### **a) If-Else**

python

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```
if age >= 18:
    print("Adult")
else:
    print("Minor")
```

### **b) Loops**

python

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```
for i in range(5):
    print(i)
```

```
while i < 5:
    print(i)
    i += 1
```

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## **◆ 7. Data Structures**

### **a) List**

python

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```
fruits = ["apple", "banana", "cherry"]
```

### **b) Tuple**

python

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```
colors = ("red", "green", "blue")
```

### **c) Set**

python

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```
unique_nums = {1, 2, 3}
```

### **d) Dictionary**

```
python
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student = {"name": "Dhanush", "age": 21}
```

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## ♦ 8. Functions

```
python
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def greet(name):
    return "Hello " + name

print(greet("Dhanush"))
```

- `*args` for multiple arguments
- `**kwargs` for keyword arguments

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## ♦ 9. Object-Oriented Programming (OOP)

```
python
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class Student:
    def __init__(self, name):
        self.name = name

    def greet(self):
        print("Hi", self.name)

s1 = Student("Dhanush")
s1.greet()
```

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## ♦ 10. File Handling

```
python
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with open("data.txt", "w") as file:
```

```
        file.write("Hello World")

with open("data.txt", "r") as file:
    print(file.read())
```

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## ♦ 11. Exception Handling

```
python
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try:
    x = 10 / 0
except ZeroDivisionError:
    print("Cannot divide by zero.")
finally:
    print("Done")
```

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## ♦ 12. Modules and Packages

```
python
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import math
print(math.sqrt(16))
```

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## ♦ 13. Python for Web (Flask Basics)

```
python
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from flask import Flask

app = Flask(__name__)

@app.route("/")
def home():
    return "Hello from Flask!"

app.run()
```

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## ◆ 14. Python Applications

- Web Development (Flask, Django)
- Data Science (NumPy, Pandas)
- Machine Learning (scikit-learn, TensorFlow)
- Automation (Scripts, Web Scraping)
- Game Development (Pygame)