1. **python Basics:**
   * **What is Python?** Python is a high-level, interpreted programming language known for its readability, versatility, and extensive standard library. It’s widely used in web development, data science, automation, and more.
   * **Key Features:**
     + **Readability:** Python’s clean syntax makes code easy to read and write.
     + **Versatility:** Python can be used for various tasks, from simple scripts to complex applications.
     + **Community and Documentation:** Python has a strong community and comprehensive documentation.
     + **Cross-Platform Compatibility:** Works seamlessly on Windows, macOS, and Linux.
     + **Extensive Libraries:** Python offers a rich ecosystem of libraries and frameworks.
   * **Use Cases:**
     + Web development (Django, Flask)
     + Data analysis and visualization (Pandas, Matplotlib)
     + Machine learning and AI (TensorFlow, PyTorch)
     + Scientific computing
2. **Installing Python:**
   * To install Python:
     + Visit the official Python website and download the installer for your OS.
     + Run the installer and follow the prompts.
   * To verify installation:
     + Open a terminal or command prompt and type python --version.
   * Setting up a virtual environment:
     + Install virtualenv using pip install virtualenv.
     + Create a virtual environment: virtualenv myenv.
     + Activate the environment: source myenv/bin/activate (Linux/macOS) or myenv\Scripts\activate (Windows).
3. **“Hello, World!” Program:**

**Python**

print("Hello, World!")

AI-generated code. Review and use carefully.

1. **Data Types and Variables:**
   * Basic data types: int, float, str, bool
   * Example:

**Python**

age = 25

name = "Alice"

is\_student = True

1. **Control Structures:**
   * Conditional statements (if-else):

**Python**

if age >= 18:

print("You're an adult.")

else:

print("You're a minor.")

* + Loops (for and while):

**Python**

for i in range(5):

print(i)

1. **Functions:**
   * Functions allow code reuse.
   * Example:

**Python**

def add(a, b):

return a + b

result = add(3, 5)

print("Sum:", result)

1. **Lists and Dictionaries:**
   * Lists (ordered, mutable):

**Python**

numbers = [1, 2, 3, 4]

* + Dictionaries (key-value pairs):

**Python**

person = {"name": "Bob", "age": 30}

print(person["name"])

1. **Exception Handling:**
   * Use try, except, and finally blocks to handle errors.

**Python**

try:

result = 10 / 0

except ZeroDivisionError:

print("Error: Division by zero")

finally:

print("Cleanup code")

1. **Modules and Packages:**
   * Modules are Python files containing functions and variables.
   * Packages are directories containing multiple modules.
   * Example using the math module:

**Python**

import math

print(math.sqrt(16))

1. **File I/O:**
   * Reading from a file:

**Python**

with open("myfile.txt", "r") as file:

content = file.read()

print(content)

* + Writing to a file:

**Python**

data = ["apple", "banana", "cherry"]

with open("fruits.txt", "w") as file:

for item in data:

file.write(item + "\n")