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Creating and Using a Module in Python

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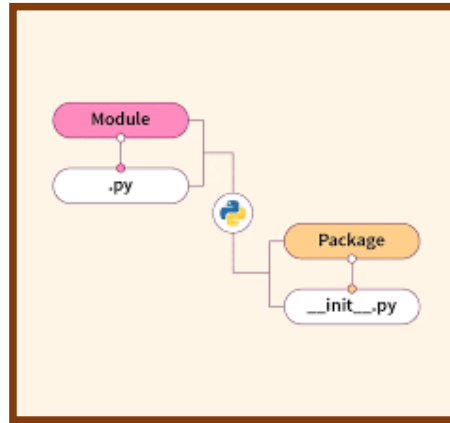
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Creating and Using a Module in Python

A **module** in Python is simply a file that contains Python code – it may have functions, variables, or classes. You can **reuse** this code in other programs by **importing** the module. Think of a module as a **toolbox** – you write tools (functions or variables) inside it once and then use them anywhere.



Why to use Modules?

- Code Reusability: Write once, reuse in multiple programs.
- Organized Code: Split large code into manageable, logical files.
- Easy Maintenance: Fix or update code in one place.
- Built-in Functionality: Use ready-made modules like math, os, random, etc.
- Improves Collaboration: Teams can work on different modules simultaneously.
- Saves Time: Avoid writing the same code again and again.
- Extend Functionality: Use third-party modules (like numpy, pandas, requests) to add powerful features.

Solved Example 1: Creating a Module

You can create a module by **saving** Python code in a file with a **.py** extension.

Example - mymodule.py

```

# This is my custom module

def greet(name):
    return f"Hello, {name}! Welcome to Python Modules."

def add(a, b):
    return a + b

pi = 3.14159
  
```

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Here:

- We have defined two functions (greet, add)
- And one variable (pi)

This is our module file.

Solved Example 2: Using the Module

Now we'll use the above module in another file (program).

Example - main.py

```
import mymodule  
  
print(mymodule.greet("Mansi"))  
print("Sum is:", mymodule.add(10, 5))  
print("Value of Pi:", mymodule.pi)
```

Output:

Hello, Mansi! Welcome to Python Modules.

Sum is: 15

Value of Pi: 3.14159

Solved Example 3: Importing Specific Items

You don't always need to import everything.

You can import **specific functions or variables** like this:

```
from mymodule import greet, pi
```

```
print(greet("Sita"))
```

```
print("Pi is:", pi)
```

Output:

Hello, Sita! Welcome to Python Modules.

Pi is: 3.14159

Solved Example 4: Renaming a Module (Alias)

You can give a short name to your module using as:

```
import mymodule as m
```

```
print(m.add(3, 4))
```

Output:

7

Built-in Modules

Python also comes with many predefined modules such as:

- math → for mathematical operations
- random → for random numbers
- datetime → for working with dates and time
- os → for operating system commands

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Example:

```
import math

print(math.sqrt(25)) # Square root
print(math.pi)      # Value of pi
```

Output:

5.0
3.141592653589793

Different Methods of Modules

Method	Description	Example Usage
Import entire module	Load the whole module; use module name to access anything inside it.	Using math.sqrt() or random.randint()
Import specific item	Load only a specific function, class, or variable from a module.	Using sqrt() directly without math.
Import multiple specific items	Load several specific functions or variables from a module.	Use sqrt() and ceil() without prefix
Import with alias	Give the module a shorter or custom name to make your code cleaner.	Use np.array() instead of numpy.array()

Solved Example Using Built-in Module

Ques: Write a Python program using the **math** module that:

- Calculates the **square root** of 81
- Prints the value of **π (pi)**
- Rounds 4.75 **upward** using math.ceil()

Solution:

```
# Importing the math module
import math

# 1. Calculate the square root of 81
sqrt_result = math.sqrt(81)

# 2. Print the value of pi
pi_value = math.pi

# 3. Round 4.75 upward using math.ceil()
rounded_value = math.ceil(4.75)
```



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```
# Display the results
print("Square root of 81 is:", sqrt_result)
print("Value of Pi is:", pi_value)
print("Rounded value of 4.75 is:", rounded_value)
```

Output:

Square root of 81 is: 9.0
Value of Pi is: 3.141592653589793
Rounded value of 4.75 is: 5

Explanation:

1. import math

This line **imports the built-in math module**, which provides many mathematical functions like square root, trigonometry, rounding, etc.

2. math.sqrt(81)

- The function sqrt() returns the **square root** of a number.
- math.sqrt(81) → gives 9.0
(because $\sqrt{81} = 9$)

3. math.pi

- math.pi is a **predefined constant** that stores the value of π (pi).
- Its value is approximately 3.141592653589793.
- It's useful in calculations involving circles and geometry.

4. math.ceil(4.75)

- The ceil() function rounds a number **upward** to the nearest integer.
- Example:
 - math.ceil(4.1) → 5
 - math.ceil(4.75) → 5
 - math.ceil(5.0) → 5

Assignment

Q1. Creating and Importing a Module

Create a module file named **math_utils.py** that contains:

- A function square(num) that returns the square of a number.
 - A function cube(num) that returns the cube of a number.
- Now, write another Python file to import this module and:
- Print the square and cube of 5.

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Expected Output:

Square of 5 is: 25

Cube of 5 is: 125



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Q2. Importing Specific Functions

Create a module called `greetings.py` containing two functions:

- `good_morning(name)`
- `good_night(name)`

Then in another file, import **only** the `good_morning()` function and print a message for your name.

Expected Output:

Good morning, Akash! Have a great day ahead.



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