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Module: Scientific Programming
Level: 2nd Year LMD
Specialty: Physics
Session: Practical Work N°1
Subject: Getting Ready

SESSION 1

TP 1: GETTING READY – Your First Steps with Python & the Command Prompt

Welcome! No prior programming experience is required for this session.

LEARNING GOALS – BY THE END OF THIS SESSION YOU WILL BE ABLE TO...

- Explain, in your own words, what Python is and what the Command Prompt is used for.
- Open the Command Prompt (`cmd`) and launch the Python interpreter already installed on the machine.
- Type and run Python instructions directly, one at a time, in **interactive mode**.
- Write a small Python program in a text file and run it as a **script** from the Command Prompt.
- Understand, with a simple example, why Physics students need programming.

FIRST OF ALL – WHAT IS PYTHON? WHAT IS THE COMMAND PROMPT?

Python is a programming language: a set of simple, English-like instructions that a computer can understand and execute, step by step. It is one of the easiest languages to start with, and it is now the most widely used language in science and Physics.

The Command Prompt (`cmd`) is a plain black window where you type text commands instead of clicking icons. It is already installed on every Windows computer. Today we will use it to talk directly to Python.

Python is already installed on the lab computers: you do not need to install or download anything.

Step 1 – Open the Command Prompt

GUIDED PRACTICE – FOLLOW EACH STEP CAREFULLY

1. Click the **Start** menu (Windows icon) or press the **Windows key**.
2. Type `cmd` and press **Enter** (or click on **Command Prompt** in the results).
3. A black window opens with a blinking cursor next to a path ending in `>`. This is the Command Prompt: it is waiting for your instructions.

Step 2 – Launch Python (Interactive Mode)

WALKTHROUGH

In the Command Prompt window, type the following and press **Enter**:

```
python
```

(If Windows says `python` is not recognized, try `py` instead.) Python starts and shows its version number, followed by a new prompt `>>>`. This symbol means Python is now listening and ready to execute whatever you type next, line by line.

Step 3 – Run Your First Lines of Code

LET'S TRY

Next to the `>>>` prompt, type the following lines exactly (press **Enter** after each one):

```
print("Hello, Physics Students at Biskra University!")
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```

What is happening? The instruction `print(...)` displays whatever text is between the quotation marks. The second line is a simple calculation: in interactive mode, Python automatically displays the result of every expression you type, even without `print`.

VOCABULARY TO REMEMBER

Command Prompt / Terminal: the black window where you type text commands. **Interpreter:** the Python program that reads and executes your instructions. **Interactive mode:** typing code line by line after >>> and seeing results instantly. **Script:** a text file (`.py`) containing a full program, run all at once.

Step 4 – Leave Interactive Mode

SHORT THEORY

Interactive mode is great for quick tests, but it does not save your work. For a real program, we write a **script**: a text file listing every instruction, which Python then runs from start to finish. First, leave interactive mode by typing:

```
exit()
```

You are back at the normal > prompt of the Command Prompt.

Step 5 – Write and Run Your First Script

WALKTHROUGH

1. **Setup your folder via Command Prompt:** To keep the computer organized, switch to the data drive, create a global workspace, and set up your personal directory by typing these commands sequentially:

```
D:
mkdir TP_Python
cd TP_Python
mkdir TP_YourFullName
cd TP_YourFullName
```

2. **Write and save your code:** Open **Notepad** from the Start menu, write your Python lines inside, then select *File > Save As....* Navigate to `D:\TP_Python\TP_YourFullName`, name the file exactly `tp1.py`, and select "All Files" as type so it does not become a `.txt` file.
3. **Execute your script:** Return to the Command Prompt window (which is already inside your personal folder) and execute your script by typing:

```
python tp1.py
```

(Or use `py tp1.py` if `python` is not recognized).

Step 6 – Physical Application: Computing Kinetic Energy

GUIDED PRACTICE

Let us use Python as a smart calculator to find the kinetic energy of a laboratory projectile, using the formula you already know from Mechanics:

$$E_c = \frac{1}{2}mv^2$$

with mass $m = 2.5$ kg and velocity $v = 4.0$ m/s. Type the following lines in your Notepad script, save it, then run it from the Command Prompt as in Step 5:

```
mass = 2.5
velocity = 4.0
kinetic_energy = 0.5 * mass * (velocity ** 2)
print("The Calculated Kinetic Energy is:", kinetic_energy, "Joules")

```

Note: in Python, `**` means "power" (e.g., `velocity ** 2` means v^2), and `*` means multiplication.

IF SOMETHING GOES WRONG...

"python is not recognized"? Try typing `py` instead of `python`.
Red error message (`SyntaxError`, etc.)? Read it calmly – it usually points to a missing quotation mark, parenthesis, or a typo. Compare your line, character by character, with the example above.
"No such file or directory"? Make sure the Command Prompt is in the same folder as your script (check with `cd Desktop`) and that the file really ends in `.py`.

ICEBREAKER CHALLENGE – TRY IT YOURSELF (NO SOLUTION GIVEN)

1. At the very top of your script, add a line starting with `#` (a comment, ignored by Python) with your full name, student registration number, and group.
2. Below it, write a few more lines to calculate the potential energy $E_p = m \cdot g \cdot h$, given $m = 5$ kg, $g = 9.81$ m/s^2, and an elevation of $h = 10$ m. Save and run the script to verify your output.