

Intro to Programming: Lesson Plan

Lesson Title: Understanding Data Types & Making Decisions

Language: Python

Duration: 75 minutes

Level: Beginner

Class Format: Lecture + Live Coding + Guided Practice


Learning Objectives

By the end of this class, students will be able to:

- Identify Python's core data types (`int`, `float`, `str`, `bool`, `NoneType`)
- Use `type()` to inspect a variable's data type
- Understand and apply `input()` and convert user input to the correct type
- Use `if`, `elif`, `else` statements to control code behavior
- Understand Python's whitespace rules and how indentation defines blocks
- Write simple, interactive programs with conditional logic

Class Agenda (75 Minutes)

| Time | Topic |
|-----------|---|
| 0:00–0:05 | Welcome & Lesson Goals |
| 0:05–0:18 | Data Types & <code>type()</code> + <code>NoneType</code> |
| 0:18–0:25 | <code>input()</code> + Type Conversion |
| 0:25–0:30 | Whitespace & Indentation |
| 0:30–0:45 | Conditionals (<code>if</code> , <code>elif</code> , <code>else</code>) + Truthiness |
| 0:45–1:00 | Demos & Guided Practice |
| 1:00–1:15 | Mini Lab: “Access Control” + Recap & Q&A |

 Using `type()` Function

```
print(type(5))           # <class 'int'>
print(type("Hi"))       # <class 'str'>
print(type(3.14))       # <class 'float'>
print(type(True))       # <class 'bool'>
print(type(None))       # <class 'NoneType'>
```

Live demo: Ask students to guess the output before running.

Why `NoneType` Exists

- Used to represent “no value yet”
- Common in:
 - Unset values
 - Function return values
 - Placeholders

```
response = None
if response is None:
    print("waiting for response...")
```

0:18–0:25 — `input()` Function + Type Conversion

`input()` Always Returns a String

```
name = input("what is your name? ")
print("Hello,", name)
print(type(name)) # <class 'str'>
```

Type Conversion

- Convert to `int`, `float`, etc.:

```
age = int(input("Enter your age: "))
height = float(input("Enter your height in meters: "))
```

Show what happens if you try math on input without conversion:

```
x = input("Number? ")
print(x + 1)    # Error!
```

0:25–0:30 — Whitespace & Indentation in Python

◆ Python uses indentation instead of `{}` or `end`

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

No `{}` or `end` like other languages

Python uses indentation to group code

- Indent blocks with 4 spaces (NOT tabs)
- Mixing spaces/tabs = ❌ `IndentationError`
- All code inside a block must be at the same indent level

Live Error Demo

```
if True:
print("Oops!")    # No indentation: error
```

Fix

```
if True:
    print("Correct")
```

Scope 🧠: Where Variables Exist

```
age = 25

if age > 18:
    message = "welcome!"

print(message)    # works
```

compare

```
if True:
    new_var = 42

print(new_var) # Works – Python's if-blocks don't create a new scope
```

```
if False:
    hidden = 100

print(hidden) # NameError: variable was never created
```

Emphasize: **If the block never runs, the variable is never created.**

0:30–0:45 — Conditional Statements & Truthiness

◆ Control Flow with `if`, `elif`, `else`

```
if temp > 30:
    print("Hot")
elif temp < 10:
    print("Cold")
else:
    print("Nice")
```

◆ Comparison & Logical Operators

| Symbol | Meaning | Example |
|---|----------------|-------------------------------------|
| <code>==</code> | Equal to | <code>x == 10</code> |
| <code>!=</code> | Not equal | <code>x != 5</code> |
| <code>></code> / <code><</code> | Greater / Less | <code>x > 5</code> |
| <code>and</code> , <code>or</code> , <code>not</code> | Logic | <code>x > 0 and x < 10</code> |

◆ Truthy vs Falsy

```
if 0: print("False")
if 1: print("True")
if "": print("False")
if "Hi": print("True")
```

Explain that most non-empty values are `True`, empty values are `False`

0:45–1:00 — Live Demos & Guided Practice

Demo 1: Type Guessing Game

```
print(type("42"))      # str
print(type(42))         # int
print(type(42.0))       # float
print(type(True))       # bool
print(type(None))       # NoneType
```

Demo 2: Temp Checker

```
temp = float(input("Enter temperature in Celsius: "))
if temp < 0:
    print("Freezing!")
elif temp <= 30:
    print("Normal temperature")
else:
    print("Too hot!")
```

Demo 3: Truthiness

```
if "":
    print("Empty string is True")
else:
    print("Empty string is False")

if 0:
    print("Zero is True")
else:
    print("Zero is False")
```

💡 Demo 3: 🌡 Temperature Converter (New!)

```
f = float(input("Enter temperature in Fahrenheit: "))
c = (f - 32) * 5 / 9
print(f"{f}°F is {round(c, 2)}°C")
```

```
c = float(input("Enter temperature in Celsius: "))
f = (c * 9 / 5) + 32
print(f"{c}°C is {round(f, 2)}°F")
```

Optional Homework (For Extra Practice)

1. Even/Odd Checker

- Ask for a number
- Print "Even" or "Odd"

2. Grading System

- Get a number between 0–100
- Print letter grade (A/B/C/D/F)

3. Simple Login

- Ask for username + password
- Only allow if both are correct