Introduction to Python: Variables and Data Types

Chapter 1: Understanding Variables and Data Types

In the first semester of CS101, students will dive into the fundamentals of Python, starting with one of its core concepts: Variables and Data Types.

1. **What is a Variable?**

   A variable in Python acts as a container for storing data values. For example, `x = 5` assigns the value 5 to the variable x. Variables can store various data types and can be reassigned.

2. **Data Types in Python**

   Python has several built-in data types. Here are a few:

   - **Integers (`int`)**: Whole numbers, e.g., 1, -10, 42.
   - **Floats (`float`)**: Numbers with a decimal point, e.g., 3.14, -0.5.
   - **Strings (`str`)**: Text enclosed in quotes, e.g., "Hello", 'CS101'.
   - **Booleans (`bool`)**: True or False values.

3. **Declaring and Using Variables**

   Students will learn how to declare variables:

   ```python
   age = 20
   name = "Alice"
   pi = 3.14159
   is_student = True
   ```

4. **Best Practices**

   - Use descriptive names: Instead of `x`, use `student_age`.

   - Stick to lowercase for variable names with underscores for separation.

   - Avoid starting names with numbers or special characters.

5. **Hands-on Exercise**

   Write a program to:

   - Assign values to variables `name`, `age`, and `grade`.

   - Print these variables in a sentence, such as: "Alice is 20 years old and has a grade of 95."

By the end of this chapter, students will have a solid grasp of Python's basic building blocks and be ready to tackle more complex concepts in the course.