Introduction to Software Development Week 4: Collections

1. Learning Objectives

- Understand the purpose of collection data structures.
- Create and manipulate lists to store ordered collections of items.
- Access, add, remove, and modify elements in a list.
- Use loops to iterate over items in a list.

2. Core Concepts

- **What is a Collection?**
    - A data structure that groups multiple items into a single unit.
    - Essential for managing related data, e.g., a list of students, a collection of sensor readings.
- **The List (`list`)**
    - An ordered, mutable (changeable) collection of items.
    - **Indexing:** Accessing elements by their position. In Python, indexing starts at `0`.
    - **Slicing:** Accessing a sub-section of the list.
- **Common List Methods:**
    - `.append(item)`: Adds an item to the end of the list.
    - `.remove(item)`: Removes the first occurrence of an item.
    - `.pop(index)`: Removes and returns the item at a given index.
    - `len(list)`: A built-in function to get the number of items in the list.

3. Code Examples

```python
# Creating a list of modules

modules = ["Software Dev", "Networking", "Database Systems"]


# Accessing an element

first_module = modules[0] # "Software Dev"


# Adding an element

modules.append("Web Development")


# Removing an element

modules.remove("Networking")
```

```
# Looping through the list

for module in modules:

    print(f"Module: {module}")
```

4. Summary

Lists are one of the most versatile and common data structures. Mastering them is key to writing programs that can handle real-world sets of data.