Introduction to Programming in Swift

Module 1- Introduction to Swift

- Overview of Swift programming language
- Swift development tools (Xcode, Swift Playgrounds)
- Swift syntax basics (variables, constants, data types)
- **Project Lab**: Set up a basic Swift project in Xcode and write simple Swift code to declare variables, constants, and data types.

Module 2- Control Flow and Conditional Logic

- If statements
- Switch cases
- Loops (for, while, repeat-while)
- **Project Lab**: Build a number guessing game using if statements and loops to control the flow of the game.

Module 3. Collections: Arrays and Dictionaries

- Arrays: creating, accessing, modifying
- Dictionaries: creating, accessing, modifying
- Iterating through collections
- **Project Lab**: Build a simple inventory management system using arrays and dictionaries to store items and their quantities, and add functionality to update and display the inventory.

Module 4- Functions and Closures

- Defining and calling functions
- Function parameters and return values
- Introduction to closures
- **Project Lab**: Create a calculator app with functions for addition, subtraction, multiplication, and division, along with a closure that handles logging results.

Module 5. Optionals and Error Handling

- Understanding optionals (nil, optional binding, optional chaining)
- Error handling (try, catch, throw)

- **Project Lab**: Create a data processing system that reads a list of strings representing potential numbers. Use optionals to safely unwrap the values and error handling to manage conversion failures. The system should process the list and return the valid numbers while handling and logging errors for invalid entries.

Module 6. Object-Oriented Programming in Swift

- Classes and structs
- Properties and methods
- Inheritance and polymorphism
- **Project Lab**: Create a basic contact management system where users can add, edit, and display contact information using classes and inheritance to represent different types of contacts (personal, business).

Module 7. Protocols, Delegation, and Extensions

- Defining and conforming to protocols
- Delegation pattern
- Extending types using extensions
- **Project Lab**: Build a simple to-do list app where tasks can be created and completed, with protocols to handle task updates and extensions to add functionality to strings (e.g., trimming whitespace).

Module 8. Enumerations and Optionals

- Defining and using enumerations
- Associated values in enums
- Optionals revisited (optional chaining with enums)
- **Project Lab**: Design a weather app that uses enums to represent different weather conditions, and handle optionals to display weather data (temperature, humidity) only if available.

Module 9. Memory Management and Closures

- Automatic Reference Counting (ARC)
- Strong vs. weak references
- Capturing values with closures
- **Project Lab**: Create a media library app that loads images using closures and demonstrates memory management using strong and weak references.