

Dart Course Outline

Week 1: Introduction to Dart

Content:

- **Overview of Dart:** Introduction to the Dart programming language.
- **Introduction to Flutter:** Understanding Flutter framework for cross-platform development.
- **Course Structure:** What to expect from the course.
- **Hands-on with DartPad:** Setting up and writing your first Dart program. <https://dartpad.dev/>

Week 2: Dart Basics

Content:

1. **Section Introduction**
2. **Main Method:** Explanation of the main entry point in Dart.
3. **Hello World:** Writing your first Dart program.
4. **Variable Declaration and Initialization:** Understanding how to declare and initialize variables in Dart.
5. **Basic Types:** Exploring common data types.
 - **Exercise:** Printing variables.
6. **String Concatenation & Interpolation:** Different ways to work with strings in Dart.
 - **Exercise:** String interpolation.
7. **String Escaping:** Handling special characters in strings.
8. **Multi-line Strings:** How to work with multi-line strings.
9. **String Operations:** Converting strings to uppercase and lowercase.
 - **Exercise:** Converting strings to different cases.
10. **Finding and Replacing Strings:** Working with string functions.
11. **Conversions Between Types:** Casting between different types.
12. **Arithmetic Operations:** Performing calculations in Dart.
 - **Exercise:** Temperature conversion between Celsius and Fahrenheit.
13. **Increment & Decrement Operators:** Understanding how to modify variables.
14. **Logical & Relational Operators:** Conditional and comparison operators.
15. **Ternary Operator:** Conditionally assigning values.
16. **Hex, Bitwise, and Shifting Operators:** Working with binary and hexadecimal values.
17. **Comments in Dart:** Adding single-line and multi-line comments.
18. **Expressions & Statements:** Differentiating between expressions and statements.

Week 3: Dart Type System & Control Flow

Content:

1. **Section Introduction**
2. **Static vs Dynamic Languages:** Understanding how Dart handles types.
3. **Type Inference with `var`:** Using the `var` keyword.
4. **`final` and `const` Keywords:** Declaring constants in Dart.
 - **Exercise:** Understanding `var`, `final`, and `const`.
5. **Dynamic Keyword:** When to use dynamic types.
6. **Control Flow:** Handling decision-making in your code.
 - **If/Else Statements:** Conditional logic.
 - **Exercise:** Writing `if/else` statements.
 - **Loops:** `while` and `for` loops.
 - **Exercise:** FizzBuzz implementation.
 - **Break & Continue:** Controlling loop flow.
7. **Switch Statements:** Alternative to complex `if/else`.
8. **Enumerations:** Working with enums in Dart.
 - **Exercise:** Building a simple calculator using control flow.

Week 4: Command Line App (Project)

- Build a command-line application using Dart, applying learned concepts.

Week 5: Collections & Null Safety

Content:

1. **Section Introduction**
2. **Lists in Dart:** Understanding list operations.
 - **Exercise:** Sum of items in a list.
3. **List Methods:** Explore available methods for lists.
4. **Type Annotations in Lists**
5. **`var`, `final`, `const` with Lists:** Working with lists as constants.
6. **Sets in Dart:** Set operations.
 - **Exercise:** Working with sets.
7. **Maps in Dart:** Key-value pair collections.
8. **The `as` Operator:** Typecasting in Dart.
9. **Null Values in Dart**
10. **Iterating on Maps**
 - **Exercise:** Pizza ordering using maps.
11. **Nested Collections:** Handling collections within collections.
 - **Exercise:** Restaurant ratings system.
12. **Collection-if and Collection-for**
13. **Spreads in Dart**

- **Exercise:** Building a shopping list with spreads.
- 14. **Copying Collections**
- 15. **Introduction to Null Safety:** Dart's approach to null safety.
- 16. **Nullable vs Non-nullable Variables**
- 17. **Flow Analysis**
- 18. **Assertion Operator**
- 19. **If-null Operator (??)**
- 20. **Null Safety in Collections**
- 21. **Conditional Access Operator**

Week 6: Data Processing in Dart (Project)

- Apply your Dart knowledge to process data and build a small project.

Week 7: Functions in Dart

Content:

1. **Section Introduction**
2. **Introduction to Functions**
3. **Function Arguments & Return Values**
 - **Exercise:** Sum of a list of numbers.
4. **Named & Positional Arguments**
5. **Required & Default Values**
6. **Default Positional Arguments**
 - **Exercise:** Pizza ordering with functions.
7. **Fat Arrow Notation**
8. **Global & Local Scope**
9. **Inner Functions & Closures**
10. **Anonymous Functions**
11. **Functions as First-class Objects**
12. **Function Types**
13. **The `forEach` Method**
14. **The `map` Method**
15. **Using Iterables**
16. **Code Reuse with Generics**
17. **The `where` and `firstWhere` Methods**
 - **Exercise:** Implementing `where` and `firstWhere` functions.
18. **The `reduce` Method**

Week 8: Object-Oriented Programming (OOP) Part 1

Content:

1. **Introduction to OOP:** Basic concepts of object-oriented programming.
2. **Classes and Objects**
3. **Methods in Classes**
4. **Constructors**
5. **Class Attributes**

Week 9: Object-Oriented Programming (OOP) Part 2

Content:

1. **Encapsulation in Dart**
 - **Getters and Setters**
 - **Arrow Functions**
2. **Inheritance:** Understanding parent-child class relationships.
3. **Super Constructors**

Week 10: Object-Oriented Programming (OOP) Part 3

Content:

1. **Overriding Methods**
2. **Polymorphism**
3. **Abstract Classes & Implements**
4. **Named Constructors**
5. **The `late` Keyword**
6. **Enums in Dart**

Week 11: Mixins, Extensions, Error Handling, and Async Programming

Content:

1. **Section Introduction**
2. **Mixins:** Code reuse through mixins.
3. **Extensions:** Extending functionality with extensions.
 - **Exercise:** Creating a range extension.
4. **Error Handling:** Handling errors and exceptions.
 - **Exercise:** Validating emails.
5. **Asynchronous Programming:** Using futures, async/await, and streams.
 - **Exercise:** Countdown timer with futures.
 - **Exercise:** FizzBuzz with streams.