MOBILE DEVELOPMENT 1 - FOUNDATIONS

Course Syllabus

Course Title	Mobile Development Foundations
Department	IDT Computer Sciences
Credit	3
In-class hours	45 hours (30 sessions)
Outside-class hours	60 hours (*recommended for assignments, projects, and self-study)*
Period	Year 3 –Term 1
Revision	September 2024 - Generation 09
Author	R. Ogor

Instructors

GROUP	*THEORY*	*PRACTICE*	*PRACTICE*
G1	R. OGOR	R. OGOR	R. OGOR
G2		R. OGOR	R. OGOR
G3		R. OGOR	R. OGOR

Flutter

1. COURSE DESCRIPTION

Welcome to the Flutter Foundation Course!

This course is designed to help you start your journey in Flutter development, giving you the tools and knowledge to create simple applications.

You'll begin by learning the **Dart programming language** and gradually explore **Flutter widgets**, how to manage states, handle user inputs.

Our focus is on teaching you how to **build mobile apps in a way that makes them easy to maintain and scale.** You'll learn to think like a developer, using a component-based and object-oriented approach, which is essential for building high-quality applications.

Beyond coding, we believe in the importance of **working together and learning from each other**. You'll have opportunities to collaborate with your peers, provide and receive feedback, and share your thoughts and ideas on our Discord channels. This will help you learn faster and build a strong community around your learning experience.

As you progress, you'll **create a personal portfolio** to track your achievements and show what you've learned. This portfolio will not only help you reflect on your progress but also serve as a showcase for potential employers.

We're excited to help you build a solid foundation in Flutter development. Let's get started and make this journey a success!

2. COURSE LEARNING OUTCOMES

By the end of the course, you should gain the following outcomes:

Knowledge	*Theoretical or factual information you need to understand.*
✓ **Dart**	Demonstrate the foundational concepts of Dart, including OOP principles
✓ **Flutter**	Explain how Flutter updates the UI based on the app's current state
✓ **Widgets**	Identify Flutter widgets to handle lists, inputs, layouts, modals, conditional display etc.
✓ **States**	Demonstrate the principles of Stateless and Stateful widgets in Flutter
Skills	*Practical abilities you need to acquire*
✓ **Flutter Widgets**	Manipulate the basic widgets effectively. ○ Image, Text, Buttons, Icon, SizedBox ○ TextField, Checkbox, Radio, Switch, Form, AlertDialog ○ Container, Card, Row, Column, Expdanded, Stack ○ SizedBox, Padding, Spacer, DecoratedBox ○ ListView, SingleChildScrollView, GestureDetector ○ StatelessWidget, StatefulWidget ○ AppBar, Scaffold, Navigator, Drawer
✓ **Custom Widgets**	Implement custom reusable widgets to enhance modularity and maintainability
✓ **Debug**	Adopt a proper investigation methodology and tools to troubleshoot app issues
✓ **Create**	Develop a personal app to **demonstrate your competence achievements**
Attitudes	*Values, motivations, and dispositions you need to develop.*
✓ **Creative mindset**	Propose **innovative and creative** solutions, **beyond** course assignments
✓ **Collaborate**	Engage actively in **collaborative work** and receive **peer feedback positively**
✓ **Share**	**Share ideas** and solutions on channels to actively contribute to our community

3. COURSE ORGANISATION

The course spans 10 weeks and follows the bellow objectives outlined for each week:

	Learning	Micro Projects	Project	Industry
W 01	Dart			
W 02	Flutter basic widgets	Restaurant Management System		
W 03	Stateless Widgets			
W 04	Stateful Widgets	Profile App		
W 05	Layouting, Inputs, Lists	Dice App		
W 06	Quiz App Refactoring and debugging	Quiz app	App *Proposal*	
W 07	Manage lists and modals	Todo List app		Seminar Day
W 08	User Inputs Validation	Currency converter, Calculator	App *Follow up*	
W 09	Routing	Expense app		
W 10	Revision , Projet			
W 11			App *Jury*	

The course is composed of 30 sessions, described as follows:

W1 – DART		
S1	KICK OFF	• Flutter: a cross-platform development framework… • Course Overview, agenda • Course learning objectives • Expected work and attitude • Course evaluation (XPs) • Course tools: MSTeam, VS Code, GitHub • Resources

S2	PRACTICE	**Dart Basics**
		• Types: Number, String, List, Set, Map, Record
		• Destructuring
		• Loops, conditions
		• Functions
		  ○ Positional VS named arguments
		  ○ Arrow syntax

S3	LEARNING	**Dart OOP** • Class declaration and object instantiation • Constructors' syntax in Dart: *named constructor, factories* • CONST vs FINAL • Get and Set attributes • Encapsulation • Aggregation

W2 –FLUTTER BASIC WIDGETS

S1	LEARNING	**First Flutter App**
		• Install Flutter and Editor
		• Destructuring the first app syntax
		  - Everything is an object!
		  - Flutter UI are built by combination of widgets
		  - Widget Tree
		• MateriaApp / AppBar / Scaffold

S2	PRACTICE	**Manipulate Dart OOP** • Aggregation and composition of classes • Constructors with named attributes • Getters
S3	PRACTICE	**OOP Micro Projects** OOP concepts (classes, encapsulation, aggregation) • *Quiz system (quiz, question participants))* • *A restaurant management system (orders, menus, table reservations*

W3 – STATELESS WIDGETS		
S1	LEARNING	**Stateless widgets** • const for Flutter runtime optimization • required, optional, named or position and default arguments • Compose widgets, class and attributes • OOP inheritance concepts (super, abstract, overwrite, extends) • Understand the syntax of a StatelessWidget and the build() methods • Create a re-usable StatelessWidget and use it multiple times • Separate custom widgets in different files
S2	PRACTICE	**Manipulate basic widgets** • Start from an empty Flutter project • Hot Reload • Use Flutter doctor, update, create, run • Use Flutter Documentation • Scaffold, Text, TextStyle, Radius • Colors palettes • Container, BoxDecoration, Center, EdgeInsets, Column • Custom stateless widget
S3	PRACTICE	**Stateless widgets** • Manipulate Column layout with stretch alignment • Use Icons, Image and Card widgets • Use Enums with attributes to specify a data model • Create re-usable StatelessWidget • Manage required and optional widget properties
	REVIEW	• Peer review of last practice • Group presentation • Evaluations

W4 - STATEFULL WIDGETS		
S1	LEARNING	**Stateful Widgets** • Attach event handlers using anonymous functions (closures) in Dart. • Differentiate between Stateless and Stateful Widgets. • Explain the lifecycle of a Stateful Widget in Flutter. • Identify use cases where Stateful Widgets are needed. • Create a Stateful Widget in Flutter. • Use the setState() method to update the UI dynamically.
S2	PRACTICE	**Stateful widgets** • Create Stateful widgets • Be able to choose the right states and their type • Render color or text labels depending on a state • Use expanded widget, elevated buttons, SizeBox, image, buttons • Manage a mix of stateless and stateful widgets
S3	REVIEW	• Peer review of last practice • Group presentation • Evaluations

W5 – LAYOUTING, INPUTS, LISTS		
S1	LEARNING	Layouting
S2	PRACTICE	Input handling, Lists
S3	REVIEW	• Peer review of last practice • Group presentation • Evaluations
	PRACTICE	Start QUIZ app

W6 – QUIZ APP		
S1	LEARNING	**Create a statistic view** • Display some statistics from results • Use a plain object for statistics • Conditional Display with DecorationImage • Understand Widget Lifecycle: initState / build / dispose
	PROJECT	**Portfolio Project Proposal** Students submit and defend a personal app proposal in terms of: - Learning objectives compliance - Usefulness, creativeness - Planification (6 weeks)

S2	PRACTICE	**Refactoring and debugging**
		• VS code debugger
		• FlutterDev tools
		  ○ Widget Tree
		  ○ Performance's profiling tools
		Refactoring
		• Extract widgets

S3	REVIEW	• Peer review of last practice • Group presentation • Evaluations

W7 – MANAGE LISTS & MODALS		
S1	LEARNING	**List views and Modals** • ListView • ItemBuilder • Scroll controller • UUUID • Spread operator • Remove an item form a list • Modal and Dialogs
S2	PRACTICE	**TODO LIST APP** *A simple TODO app where users can add, edit, and delete tasks*
S3	PROJECT	Project follow up

W8 – USER INPUTS VALIDATION		
S1	LEARNING	**Inputs and validation** • Working with form inputs (*TextField, Checkbox, Radio Button, Switch, DropDown, Switch, Checkbox, DatePicker)* • Getting values using a State, on key stroke - or using a controller • Validation and submission of forms • Managing focus and keyboard input
S2	PRACTICE	**CURRENCY CONVERTER APP** *A currency convertor, using DropDown TextWidget, enhanced Enums and validation* **CALCULATOR APP** *A basic calculator with arithmetic operations, for practicing UI layout and basic logic* **BMI CALCULATOR APP** *Calculate Body Mass Index based on user input, incorporating calculations and validation*
S2	PROJECT	*Project follow up*

W9 –ROUTING		
S1	LEARNING	**Routing**
S2	PRACTICE	**EXPENSE APP** *Track daily expenses and display statistics, exploring data persistence and charting libraries*
S2	PRACTICE	**EXPENSE APP**

W10 – REVISIONS, PROJECT, RETROSPECTIVE		
S1	REVIEW	**EXPENSE APP REVIEW** *Peer review, self-evaluation, presentations*
S2	PROJECT	**Last follow up**
S3	REVIEW	Course retrospective

W11 JURY		
	PROJECT	**Project jury** Students present their app project

4. GRADING & ACADEMIC POLICY

TYPE OF EVALUATION	RATIO
Participation (*in class, online*)	10 %
Quizzes	10 %
Practice Assignments	10 %
Peer review	10 %
Portfolio Project	30 %
Exam	30 %

Participation

You must be present in all sessions of this course for the physical class

- Only absences authorized by the academic affair are allowed

Participation is scored. By participation we mean you involvement in:

- Group activities
- Action to support other students
- Online involvement in channels

Practice Assignments

- You are required to work independently to solve the assigned problem for practice
- Copying or plagiarism will be treated as academic dishonesty and will be handled according to institution regulations
- Late homework submission will result in getting zero score.

Peer reviews

In addition to each assignment, you must **evaluate 3 of your peers**, for a total of 12 evaluations at the end of the course.

Projects

As part of this course, you will undertake a **portfolio project** aimed at applying the knowledge and skills you have acquired. *See below the project's descriptions*

Exam

Final exam will be performed **without internet**. Only 1 sheet of paper with your own note will be allowed

5. PORTFOLIO PROJECT

As part of this course, you will undertake a **portfolio project** aimed at applying the knowledge and skills you have acquired. Your project will involve the following steps:

1. App Definition

- ✓ Your project must fit the following 2 constraints:
  - It needs to showcase your achievement on each of the course learning objectives
  - It needs to be useful for your (or others) daily life

2. App Proposal *(week 4)*

- ✓ You will defend your app proposal in terms of:
  - Which course learning objectives will be integrated?
  - How this app is useful for your (or others) daily life?
  - How do you plan to develop this app within the next 6 weeks?

3. App Development *(week 4 to 10)*

- ✓ You will regularly share your ideas, links, code example to your peer, using our online channels

4. App Jury (*week 10)*

- ✓ You will defend your App features and technical achievements during a jury session

6. REQUIRED SOFTWARE

You will need to install the following software/application:

SOFTWARE	REASON
Flutter/Dart SDK	The core framework for developing Flutter apps
VS Code	IDE, including Flutter/Dart extension
Android Studio	To run emulators for Android
Git	Version control system to submit code
Figma	For designing and prototyping UI/UX

Please follow the **course tool guide** to install those application properly

7. RESOURCES

FLUTTER DOC
Dart, Flutter, Pub Official websites
https://dart.dev/
https://flutter.dev/
https://pub.dev/

Flutter YouTube channel
https://www.youtube.com/@flutterdev

Flutter Cookbook
https://docs.flutter.dev/cookbook

FLUTTER CLEAN CODE GUIDE
https://proandroiddev.com/flutter-clean-code-and-best-practices-3d18b0e04ad5

FLUTTER MOOCS
Udemy - Dart & Flutter Course
https://www.udemy.com/course/learn-flutter-dart-to-build-ios-android-apps

ClassCentral MOOC
https://www.classcentral.com/classroom/youtube-flutter-tutorial-for-beginners-45851/60c82bddaba78

Udemy - Figma - UI UX
https://www.udemy.com/course/figma-ui-ux-design-advanced-tutorial
https://m1.material.io/

IDE / TOOLS – *if needed*

Online Flutter editor
https://zapp.run/profile

Online Dart editor
https://dartpad.dev/