SULTAN QABOOS UNIVERSITY
COLLEGE OF SCIENCE
DEPARTMENT OF COMPUTER SCIENCE
BACHELOR OF SCIENCE IN COMPUTER SCIENCE
COURSE OUTLINE

I. COURSE INFORMATION			
COURSE CODE	COMP4206		
COURSE TITLE	Mobile Applications Development		
OMAN QUALIFICATION FRAMEWORK (OQF) LEVEL	**8**		
CREDIT HOURS	3		
CONTACT HOURS	4		
PRE-REQUISITES	COMP3203		
CO-REQUISITES	-		
EQUIVALENT COURSES	-		
INCOMPATIBLE COURSES	-		
COURSE CATEGORY	☐ University Requirement	☐ University Elective	
	☐College Requirement	☐ College Elective	
	☐ Department Requirement	☐ Department Elective	
	☐ Major Requirement	☐ Major Elective	
	☒ Specialization Requirement	☐ Specialization Elective	
	☐ Other (specify):		
COURSE OWNER	College: Science	Department: Computer Science	
	Center:	Unit:	
DELIVERY MODE	☒ Face to Face	☐ Blended	☐ Online
COURSE TYPE	☐ Lecture	☒ Lecture/Lab	
	☐ Lecture/Seminar	☐ Lecture/Studio	
	☐ Lecture/Tutorial	☐ Lecture/Lab/Tutorial or Seminar	
	☐Tutorial	☐ Laboratory (Practical)	
	☐ Field or Work Placement	☐ Studio	
	☐Seminar	☐ Internship	
	☐ Workshop	☐ Project	
	☐ Thesis	☐ Other (specify):	
LANGUAGE OF INSTRUCTION	English		
COURSE DESCRIPTION	As mobile devices are becoming more ubiquitous, developers are now devoting significant effort to build applications for these smartphone and tablet devices. This course examines the principles of mobile application design and development. Topics will include introduction to mobile computing, existing approaches and available technologies, mobile application development		

	architectures (MVC), user interface design and building, input methods, data handling, messaging, network techniques, location-based services, content providers and security issues in mobile applications.		
TEACHING AND LEARNING STRATEGIES	☐ Augmented Reality	☐ Flipped Classroom	
	☐ Blended Learning	☐ Problem-Based Learning	
	☐ Discovery-Based Learning	☐ Project-Based Learning	
	☐ Student-Led Learning	☐ Team-Based Learning	
	☐ Work-Based Learning	☐ Other (specify):	
ASSESSMENT COMPONENT AND WEIGHT	☒In-term examination(s) (20%)	☐ Quizzes (%)	☒Other (Lab Exercises): (5%)
	☐ Homework assignments (%)	☒Project (15 %)	
	☒ Final examination (40%)	☒ Practical/ Lab (20%)	
TEXTBOOKS AND EDUCATIONAL MATERIAL	• Textbook: o Beginning Flutter: A Hands On Guide To App Development by Marco L. Napoli, John Wiley & Sons, Inc., 2020. • References: o Beginning App Development with Flutter: Create Cross-Platform Mobile Apps by Rap Payne, First Edition, 2019 o Practical Flutter: Improve your Mobile Development with Google's Latest o Open-Source SDK, by Frank Zammetti, 2019. o Learning Google's Flutter Faster, 65 Example Apps, Mark Clow. E-book, 2019. o Flutter Official Documentation - https://docs.flutter.dev o Dart Official Documentation – https://dart.dev		
GRADING METHOD	☒ A-F Scale	☐ Pass/Not Pass	☐ Other (specify):

GRADING METHOD DESCRIPTION

	Range	Letter Grade	Description
A-F GRADING SCALE:	90 – 100	A	**Exceptional performance:** All course objectives achieved and met in a consistently outstanding manner.
	86 – 89.9	A-	
	81– 85.9	B+	**Very Good Performance:** The majority of the course objectives achieved (majority being at least two-thirds) and met in a consistently thorough manner.
	77 – 80.9	B	
	73 – 76.9	B-	
	68 – 72.9	C+	**Satisfactory Performance:** At least most of course objectives have been achieved and met satisfactorily.
	64 – 67.9	C	
	60 – 63.9	C-	
	55 – 59.9	D+	**Minimally Acceptable Performance:** The course objectives met at a minimally acceptable level.
	50 – 54.9	D	
	0 – 49.9	F	**Unacceptable performance:** The course objectives not met at a minimally acceptable level.

PASS/NOT PASS:	
OTHER:	

II. SEMESTER INFORMATION			
SEMESTER/YEAR	Spring 2025	**SECTION(S)**	1
DAY AND TIME	Sunday & Tuesday @ 8:00 – 9:50	**VENUE(S)**	Lab 19B
COURSE COORDINATOR	Dr. Abdullah Al-Hamdani	**COURSE TEAM**	-
COORDINATOR OFFICE	0014	**OFFICE HOURS**	Sunday and Tuesday 10:30 – 11:30
COORDINATOR EXTENSION	2414-2221	**COORDINATOR EMAIL**	abd@squ.edu.om

III. ALIGNMENT OF COURSE LEARNING OUTCOMES (CLO), PROGRAM LEARNING OUTCOMES (PLO), GRADUATE ATTRIBUTES (GA), AND OMAN QUALIFICATION FRAMEWORK (OQF) CHARACTERISTICS

CLO	PLO / SO	SQU Graduate Attributes	OQF Characteristics
1. Demonstrate an understanding of the fundamental concepts and architectures for mobile application development.	1, 6	A, F	1
2. Use Dart programming language to design and build efficient mobile applications.	1, 2, 6	A, B, F	1, 2
3. Design and implement responsive and user-friendly interfaces for cross-platform mobile applications.	1, 2, 6	A, B, F	1, 2
4. Develop interactive mobile applications capable of effectively handling user events and notifications.	1, 2, 6	A, B, F	1, 2
5. Apply state management techniques to organize and control app data and user interactions.	1, 2, 6	A, B, F	1, 2
6. Build mobile apps that use GPS tracking, location-based services and maps.	1, 2, 6	A, B, F	1, 2
7. Debug, test, and deploy mobile applications across multiple platforms.	2, 6	B, F	2
8. Collaborate effectively in a team to design and develop a complete mobile application.	3, 5	C, D	3, 4

IV. COURSE LEARNING OUTCOMES (CLOS) AND ASSESSMENT CRITERIA AND METHODS (FOR EACH CLO)

CLO1: DEMONSTRATE AN UNDERSTANDING OF THE FUNDAMENTAL CONCEPTS AND ARCHITECTURES FOR MOBILE APPLICATION DEVELOPMENT.

ASSESSMENT CRITERIA (TO ACHIEVE THIS OBJECTIVE, THE STUDENT MUST)		ASSESSMENT METHODS
A)	Identify and explain the key concepts, challenges, and benefits of mobile application development.	Midterm, Final
B)	Describe the architecture and lifecycle of mobile applications.	

C)	Analyze and compare different mobile development frameworks and technologies, highlighting their use cases and limitations.	
CLO2: USE DART PROGRAMMING LANGUAGE TO DESIGN AND BUILD EFFICIENT MOBILE APPLICATIONS.		
ASSESSMENT CRITERIA (TO ACHIEVE THIS OBJECTIVE, THE STUDENT MUST)		**ASSESSMENT METHODS**
A)	Write clean and efficient Dart code that demonstrates the use of variables, functions, and control structures.	Lab Exercises, Midterm, Project, Final.
B)	Develop applications utilizing object-oriented programming principles in Dart.	
CLO3: DESIGN AND IMPLEMENT RESPONSIVE AND USER-FRIENDLY INTERFACES FOR CROSS-PLATFORM MOBILE APPLICATIONS.		
ASSESSMENT CRITERIA (TO ACHIEVE THIS OBJECTIVE, THE STUDENT MUST)		**ASSESSMENT METHODS**
A)	Design intuitive layouts that adhere to mobile design principles, ensuring usability and accessibility.	Lab Exercises, Project, Lab Test
B)	Implement UI components that adapt dynamically to different screen sizes and orientations.	
C)	Incorporate visual consistency through appropriate use of colors, typography, and styles.	
CLO4: DEVELOP INTERACTIVE MOBILE APPLICATIONS CAPABLE OF EFFECTIVELY HANDLING USER EVENTS AND NOTIFICATIONS.		
ASSESSMENT CRITERIA (TO ACHIEVE THIS OBJECTIVE, THE STUDENT MUST)		**ASSESSMENT METHODS**
A)	Implement event-handling mechanisms to respond to user inputs.	Project, Lab Exercises, Midterm, Lab Test and Final
B)	Design and configure notifications that include push notifications and in-app alerts.	
C)	Incorporate interactive functionality like real-time updates and dynamic responses to enhance user experience.	
CLO5: APPLY STATE MANAGEMENT TECHNIQUES TO ORGANIZE AND CONTROL APP DATA AND USER INTERACTIONS.		
ASSESSMENT CRITERIA (TO ACHIEVE THIS OBJECTIVE, THE STUDENT MUST)		**ASSESSMENT METHODS**
A)	Demonstrate the ability to manage application state using common Flutter state management techniques.	Midterm, Final
B)	Implement stateful and stateless widgets to handle dynamic user interactions and update the application interface accordingly.	Lab Exercises, Project, Lab test
C)	Integrate state management solutions to efficiently manage data flows and user inputs across multiple widgets.	
CLO6: BUILD MOBILE APPS THAT USE GPS TRACKING, LOCATION-BASED SERVICES AND MAPS.		
ASSESSMENT CRITERIA (TO ACHIEVE THIS OBJECTIVE, THE STUDENT MUST)		**ASSESSMENT METHODS**
A)	Demonstrate understanding of GPS tracking, location-based services, and map integration.	Final
B)	Integrate GPS tracking functionality into a mobile application to capture and display location data.	Lab Exercises, Lab test and Project.
C)	Implement location-based services to provide dynamic content or features based on the user's current location.	
CLO7: DEBUG, TEST, AND DEPLOY MOBILE APPLICATIONS ACROSS MULTIPLE PLATFORMS.		
ASSESSMENT CRITERIA (TO ACHIEVE THIS OBJECTIVE, THE STUDENT MUST)		**ASSESSMENT METHODS**

A)	Diagnose and fix application errors using debugging tools and effective problem-solving techniques.	Lab Exercise, Project
B)	Deploy a functional mobile application using appropriate deployment tools and methods.	
CLO8: COLLABORATE EFFECTIVELY IN A TEAM TO DESIGN AND DEVELOP A COMPLETE MOBILE APPLICATION.		
ASSESSMENT CRITERIA (TO ACHIEVE THIS OBJECTIVE, THE STUDENT MUST)		**ASSESSMENT METHODS**
A)	Communicate the specifications and implementation details of a mobile application clearly, both in written and oral formats.	Project
B)	Collaborate effectively within a team to design and implement a complete mobile application.	

V. COURSE CONTENT AND SCHEDULE

WEEK	LECTURES #	TOPICS/ SUBJECTS	READINGS / CHAPTERS	REMARKS (e.g., ASSESSMENTS)
1	1	**Introduction:** Overview about Mobile Application development, Flutter Framework, Widget Lifecycles, and Structure of Mobile Applications.	Chapter 1	Midterm, Final
2	1	**Introduction:** Overview about Flutter development environment and Dart Programming Language, installation and configuration Flutter SDK, and creating Flutter application.	Chapter 1 and Chapter 2	Project, Midterm, Final
3	2	**Dart Fundamentals:** Variables, operations, statements, control structures, lists, functions, OOP concepts, Error handling and exceptions, packages, Generics, Libraries.	Chapter 3	Project, Midterm, Final
4	3	**Project Structure and Widgets**: Project structure, widgets, tree, stateless vs stateful widgets, colors, and styles.	Chapter 4 and Chapter 5	Project, Midterm, Lab Test, Final
5	3	**Widgets:** common widgets, using images and icons, using decorators, using form widgets to validate text fields	Chapter 6	Project, Midterm, Lab Test, Final
6	3	**User interface**: App bar, UI components, Margins, and padding, passing data between screens and expanded widgets.	Handout	Project, Midterm, Lab Test, Final
7	4	**Navigation and Routing**: Named Navigation routes, Animation, Navigation bars, App bars, Tab bars, Tab Views and List Views.	Chapter 8	Project, Midterm, Lab Test, Final
8	5	**Data Management**: Handling lists of data, creating and managing list views, and working with dynamic data in the app.	Chapter 9	Project, Midterm, Lab Test, Final
9	6	**State Management**: understanding state management needs, widget lifecycle, and using consumers and selectors for efficient state management.	Chapter 15	Project, Lab Test, Final

10	8	**Data with Local Persistence**: understanding JSON format, using database classes for CRUD operations, retrieving data, formatting and sorting dates.	Chapter 3	Project, Lab Test, Final
11	9	**Accessing databases on the cloud**: Firebase, Cloud Firestore, configuring Firebase projects, and Cloud Firestore Database.	Chapter 14	Project, Lab Test, Final
12	10	**Location-based services**: displaying maps, getting location data, monitoring a location	Handout	Project, Lab Test, Final
13	11	**Services and User Notifications**: background process, timers, creating services, communication between services and activities, broadcasting events, handling broadcasts, status bar notifications.	Handout	Project, Lab Test, Final
14	12	**App Debugging and Publishing**: App Debugging, Play Store, managing your app versions, using stores services to enhance apps.	Handout	Project, Final
15	13	Project Presentations		Project

VI. ADDITIONAL INFORMATION (e.g., RUBRICS, etc.)

Course Assessment:

Lab Exercises (5%), Project (15%), Midterm (20%), Lab Test (20%) and Final Exam (40%)

Items	Date Out	Due Date	Weights
Lab Exercises	Lab Sessions		5%
Project – Phase 1 Proposal and Prototype for the Mobile Application	Week 5 – Sunday	Week 8 - Sunday	**4%**
Midterm	Week 9 – Tuesday		**20%**
Project – Phase 2 Basic Mobile Application	Week 9 – Sunday	Week 11 - Sunday	**4%**
Lab Test	Week 14 – Tuesday		**20%**
Project – Phase 3 Complete Mobile Application	Week 12 – Sunday	Week 14 - Thursday	**4%**
Project –Presentation	Week 15		**3%**
Final Exam			**40%**

Department's Late Submission Policy:

(a) 1-24 hours: 25% of the mark will be deducted.

(b) > 24 hours: Not accepted.

Department's Policy for Dealing with Cheating:

It is essential that each student solves all programming assignments, lab tests and exams individually unless instructed otherwise, e.g., for group projects. Copying, plagiarism, collusion, switching, and falsification are

violations of the university academic regulations. Students involved in such acts will be severely penalized. The department has adopted a firm policy on this issue. A zero mark will be assigned the first time a student is caught involved in copying and his/her name will be added to a watch list maintained by the Head of Department. Further repeated involvements in copying will cause the student to get an F grade in that course. This is in line with the university academic regulations.

VII. STUDENTS RESPONSIBILITIES	
It is the student's responsibility to know and comply with all University Academic Regulations relevant to participation in this course. These regulations specifically include attendance requirements and student academic code of conduct.	
ACADEMIC INTEGRITY	The University expects the students to approach their academic endeavors with the highest academic integrity. Please refer to the **Undergraduate Academic Regulations**.
ADD AND DROP	Students who wish to drop or add the course should review the **Undergraduate Academic Regulations**.
ATTENDANCE	Sultan Qaboos University has a clear requirement for students to attend courses, detailed in the **Undergraduate Academic Regulations**.
ASSESSMENT AND GRADING	To ensure the provision of a sound and fair assessment and grading, please review the **Undergraduate Academic Regulations**.
GRADE APPEAL	Students who wish to appeal their grades should review the **Undergraduate Academic Regulations**.
CLASSROOM POLICIES	Students are expected to dress professionally during class time as required by the University. Use of phones or any other electronic devices in the classroom during class time is strictly prohibited. Unauthorized use may lead to faculty member confiscation of the device for the remainder of the class. Behavior that persistently or grossly interferes with classroom activities is considered disruptive behavior and may be subject to disciplinary action. A student responsible for disruptive behavior may be required to leave the class.
LATE AND MAKE-UP WORK	Students are required to meet the course objectives by submitting coursework no later than the assigned due date. Students may be allowed to submit late work if approved by the course coordinator. Assignments submitted after the due date may be penalized.
MISSED EVALUATIONS	All quizzes, tests, clinical evaluations, and exams must be completed by the date they are assigned. If a quiz, test, or exam is missed due to a documented emergency situation (e.g., medical emergency, death in the immediate family), it is the student's responsibility to contact the instructor.
OTHER	

Course Outline Appendix

1. PROGRAM LEARNING OUTCOMES / STUDENT OUTCOMES

1. Analyze a complex computing problem and to apply principles of computing and other relevant disciplines to identify solutions.
2. Design, implement, and evaluate a computing-based solution to meet a given set of computing requirements in the context of the program's discipline.
3. Communicate effectively in a variety of professional contexts.
4. Recognize professional responsibilities and make informed judgments in computing practice based on legal and ethical principles.
5. Function effectively as a member or leader of a team engaged in activities appropriate to the program's discipline.
6. Apply computer science theory and software development fundamentals to produce computing-based solutions.

2. SQU Graduate Attributes and Competencies for Undergraduate Studies

GRADUATE ATTRIBUTES	GRADUATE COMPETENCIES FOR UNDERGRADUATE STUDIES
A. Cognitive Capabilities: The graduate has sufficient general and specialized theoretical knowledge that enables him/her to deal well with his/her specialty and other related fields.	1. Demonstrates familiarity and works with advanced specialized knowledge in the area of specialization.
	2. Demonstrates a general understanding of the relationship of advanced specialized knowledge with knowledge in other relevant professional fields and aspects.
	3. Demonstrates a comprehensive understanding of the theories, principles, and methods used in his/her specialty, and how to create and apply new knowledge.
	4. Demonstrates general knowledge of the legal environment and necessary relevant regulatory frameworks.
	5. Shows awareness of contemporary literature and research.
B. Skill and Professional Capability: The graduate has sufficient skill and practical experience that enables him/her to	1. Applies concepts, theories, and investigative methods to synthesize and interpret information to evaluate conclusions.
	2. Applies appropriate research methods and techniques and employs digital knowledge

GRADUATE ATTRIBUTES	GRADUATE COMPETENCIES FOR UNDERGRADUATE STUDIES
perform all tasks related to the specialization and other related fields.	3. Evaluates and critiques information independently
	4. Uses cognitive and technical skills to analyze complex issues and develop appropriate solutions.
	5. Initiates new ideas or processes in the professional, educational or research context.
C. Effective Communication: The graduate has the ability to communicate effectively with others to achieve the desired results	1. Explains, presents, and adapts information to suit the recipients.
	2. Employs appropriate information and communication technology to collect and analyze information.
D. Autonomy and Leadership: The graduate has the ability to lead, make decisions and take responsibility for decisions.	1. Performs advanced professional activities independently.
	2. Demonstrates leadership skills.
	3. Takes professional responsibility.
	4. Assumes full accountability for the tasks and their output.
E. Responsibility and Commitment: The graduate appreciates the importance of available resources and deals with them effectively and is committed to the ethics of the profession and society.	1. Manages time and other resources assigned to accomplishing tasks effectively and responsibly.
	2. Demonstrates effective practices when working in teams.
	3. Demonstrates advanced levels of understanding of values and ethics relevant to the specialization, profession and local and international society and promotes them among others.
	4. Works within the professional, institutional, and specialization guiding frameworks and strategic plans.
	5. Interacts with community affairs positively and preserves national identity.
F. Development and Innovation: The graduate has a passion for development and- innovation in the field of specialization.	1. Demonstrates the ability to independently manage learning tasks, with an awareness of how to develop and apply new knowledge.
	2. Utilizes specialized knowledge and skills for entrepreneurship.
	3. Utilizes creative and innovative skills in the field of specialization.

3. OQF Characteristics

1. Knowledge
2. Skills
3. Communication, Numeracy, and Information and Communication Technology Skills.
4. Autonomy and Responsibility
5. Employability and Values
6. Learning to learn