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

I. COURSE INFORMATION			
COURSE CODE	COMP5405		
COURSE TITLE	Software Patterns		
OMAN QUALIFICATION FRAMEWORK (OQF) LEVEL	**8**		
CREDIT HOURS	3		
CONTACT HOURS	4		
PRE-REQUISITES	COMP3401		
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	The course introduces the Software Patterns, and explores the wide variety of patterns that may be applied to the production and maintenance of software. Topics		

	covered include: Analysis Patterns, Design Patterns, Architectural Patterns, Refactoring Patterns, and Anti-patterns.		
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) (25 %)	☐ Quizzes (%)	☐Other (specify): (%)
	☐ Homework assignments (%)	☒Project (20 %)	
	☒ Final examination (40%)	☒ Practical/ Lab (15%)	
TEXTBOOKS AND EDUCATIONAL MATERIAL	**Textbook:** • John F. Dooley, Software Development, Design and Coding: With Patterns, Debugging, Unit Testing, and Refactoring, 2nd edition, APress, 2017. **Supplemental materials:** • [1]: Craig Larman, *Applying UML and Patterns: An Introduction to Object-Oriented Analysis and Design and Iterative Development*, 3rd edition, Prentice Hall, 2004. • [2]: E. Gamma, *Design Patterns: Elements of Reusable Object-Oriented Software*, Addison-Wesley, 1995 • [3}: R. N. Taylor, N. Medvidovic, and E. M. Dashofy, *Software Architecture: Foundations, Theory, and Practice*; John Wiley & Sons, 2008		
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)	10
DAY AND TIME	MON & WED/ 8:00-9:50	VENUE(S)	SCI/0027
COURSE COORDINATOR	Dr. Yassine Al Jamoussi	COURSE TEAM	-
COORDINATOR OFFICE	No. 11, CS Dept.	OFFICE HOURS	Sun 8:00-09:50
COORDINATOR EXTENSION	2464	COORDINATOR EMAIL	yessine@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. Understand Core Design Patterns.	**6**	**A**	**1,2**
2. Master Design Pattern Implementation	**2, 6**	**A**	**1,2**
3. Analyze and Refactor Code	**2, 6**	**A**	**1,2**
4. Apply Design Patterns in Real-World Scenarios	**6**	**A**	**1,2**

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

CLO1: Understand the principle of software patterns.		
ASSESSMENT CRITERIA (TO ACHIEVE THIS OBJECTIVE, THE STUDENT MUST)		**ASSESSMENT METHODS**
A)	Grasp the fundamental concepts of design patterns, including their purpose, benefits, and trade-offs	Midterm and/or Final
B)	Learn to identify common design problems and apply appropriate patterns to solve them.	
C)	Study and analyze the Gang of Four (GoF) design patterns and their real-world applications	
CLO2: Master Design Pattern Implementation.		
ASSESSMENT CRITERIA (TO ACHIEVE THIS OBJECTIVE, THE STUDENT MUST)		**ASSESSMENT METHODS**
A)	Gain hands-on experience in implementing design patterns in various programming languages.	Project and/or Labtest and/or Final
B)	Learn to use design patterns effectively to create clean, maintainable, and scalable software.	Project
C)	Understand the best practices and coding conventions for using design patterns.	Project
CLO3: Analyze and Refactor Code.		
ASSESSMENT CRITERIA (TO ACHIEVE THIS OBJECTIVE, THE STUDENT MUST)		**ASSESSMENT METHODS**
A)	Develop the ability to analyze existing code and identify areas for improvement using design patterns.	Project and/or Final
B)	Learn to apply refactoring techniques to improve code	

	quality, readability, and maintainability.	
C)	Understand the impact of design patterns on code performance and scalability.	
CLO4: Apply Design Patterns in Real-World Scenarios.		
ASSESSMENT CRITERIA (TO ACHIEVE THIS OBJECTIVE, THE STUDENT MUST)		**ASSESSMENT METHODS**
A)	Practice using design patterns to solve real-world software design problems.	Midterm, Project and or Final
B)	Apply design patterns to improve the design of complex software systems	
B)	Evaluate alternative development techniques and technologies, comparing them to the chosen approach and explaining why the chosen approach is preferable	

V. COURSE CONTENT AND SCHEDULE

WEEK	LECT. #	TOPICS/ SUBJECTS	READINGS/ CHAPTERS	REMARKS (e.g., ASSESSMENTS)
1	**1**	Welcome and Course Description Lecture: Introduction to Software Patterns.	Ch1, [1]	Midterm and/or final
2	**1**	Lecture: Software Patterns in OO Analysis and Design **Lab: Analysis patterns**	Ch 8-9	Project, Practical test, Midterm and/or final
3	**1**	Lecture: Basic design patterns **Lab: Implementation of basic design patterns**	Ch10	Project, Practical test, Midterm and/or final
4	**1**	Lecture: Creational design patterns **Lab: Design and implementation of creational design patterns**	Ch11, [2]	Project, Practical test, Midterm and/or final
5	**1**	Lecture: Structural design patterns **Lab: Design and implementation of structural design patterns**	Ch11, [2]	Project, Practical test, Midterm and/or final
6	**1**	Lecture: Behavioral design patterns **Lab: Design and implementation of behavioral design patterns**	Ch11, [2]	Project, Practical test, Midterm and/or final
7-8	**2**	Lecture: Parallel design patterns Midterm **Lab: Design and implementation of parallel design patterns**	Ch12/13	Project, Practical test, and/or final
9		**Eid Al-Fitr**		
10	**1**	Lecture: Architectural patterns **Lab: Design and implementation of architectural design patterns**	[3]	Project, Practical test, and/or final
11-12	**2**	Lecture: Refactoring patterns and Frameworks **Lab: Frameworks & Dependency injection**	Ch14	Project, Practical test, and/or final
13	**1**	Lecture: Anti-patterns **Lab: Frameworks & patterns**	handout	final
14	**1**	Lecture: Trends of software patterns		Project, Practical test,

		Lab Test	handout	and/or final
15	**1**	**Project presentations – Review**		

VI. Additional Information (e.g., Rubrics, etc.)

A-ASSESSMENT PLAN

Project – 4 parts (20%), Midterm (25%), Lab Test (15%), and Final Exam (40%)

Items	Date Out	Due Date	Weights
Project Part1	Week 2 - Tuesday	Week 4- Saturday	5%
Project Part2	Week 5 - Sunday	Week 7 - Saturday	5%
Midterm	Week 8/Tuesday		15%
Project Part3	Week 10 - Sunday	Week 12 - Saturday	5%
Lab Test	Week 12/Tuesday		15%
Project Part4	Week13 - Sunday	Week 14 - Saturday	10%
Presentation	Week15/Sunday		5%
Final Exam	26 – May – 2025 / Mon @ 8:00		40%

B- Department's Late Submission Policy:

(a) 1-24 hours: 25% of the mark will be deducted.
(b) > 24 hours: Not accepted.

C- 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 perform	1. Applies concepts, theories, and investigative methods to synthesize and interpret information to evaluate conclusions.

all tasks related to the specialization and other related fields.	2. Applies appropriate research methods and techniques and employs digital knowledge
	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