Course Specification
(Bachelor)

Course Title:	Design Patterns
Course Code:	SE4703
Program:	BSc in Software Engineering
Department:	Software Engineering
College:	College of Computing
Institution:	Umm Al Qura University
Version:	1.0
Last Revision Date:	22/04/2025

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours: (3)					
2. Course type					
A.	☐University	☐College	☒ Department	☐Track	☐Others
B.	☐ Required		☒ Elective		
3. Level/year at which this course is offered: (3rd year/ 5th or 6th level) or (4th year/8th level)					
4. Course General Description:					
This course allows the students to explore theoretically and practically various types of software design patterns in object-oriented paradigm. Students will be able to understand the use of design patterns and explore various design patterns catalogs. Main catalog will be Gamma's catalog which divides the patterns into creational, structural, and behavioral. Furthermore, other design patterns will be studied and investigated such as security design patterns.					
5. Pre-requirements for this course (if any)**:**					
SE2301 - Software Modelling and Analysis					
6. Co-requisites for this course (if any)**:**					
N/A					
7. Course Main Objective(s):					
The main aim of this course is to teach the students the concepts of software design patterns. This includes different types of design patterns which will be practically implemented and investigated by students on their projects					

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	45	100%
2	E-learning	0	0
3	Hybrid • Traditional classroom • E-learning	0	0
4	Distance learning	0	0

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	45
2.	**Laboratory/Studio**	0
3.	**Field**	0
4.	**Tutorial**	0
5.	**Others (specify)**	0
Total		45

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of PLOs aligned with the program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	Illustrate understanding of the concepts of software design patterns and their use	K1	Lecture, exercise	Quiz, exams, assignments
1.2	Distinguish the different architectural of software design patterns	K1	Lecture, exercise	Quiz, exams, assignments
1.3	Recognize other software design patterns such as security design patterns	K3	Lecture, exercise	Quiz, exams, assignments
2.0	**Skills**			
2.1	Implement different software design patterns in real object-oriented systems	S2	Lecture, Group discussion, tutorials	Exams, assignments, project
2.2	Demonstrate ability to Select the appropriate software design patterns depending on the needs, and to evolve software design accordingly	S1	Lecture, Group discussion, tutorials	Exams, assignments, project

Code	Course Learning Outcomes	Code of PLOs aligned with the program	Teaching Strategies	Assessment Methods
2.3	Apply reporting and presentation on a software design patterns implementation	S4	Lecture, Group discussion, tutorials	Exams, assignments, project
3.0	**Values, autonomy, and responsibility**			
3.1	Demonstrate effective teamwork	V1	Project	Assignment, project

C. Course Content

No	List of Topics	Contact Hours
1.	Object-oriented principles	**3**
2.	Software Design Principles: • Dry • KISS • Law of Demeter • Liskov Principle • Dependency Injection	**6**
3.	Design patterns catalogs: Gamma catalog and other catalogs	**6**
4.	Creational patterns: Abstract factory, Builder, Factory, Prototype, Singleton.	**6**
5.	Structural patterns: Adapter, Bridge, Composite, Decorator, Facade, Flyweight, Proxy.	**6**
6.	Behavioral patterns: Chin of responsibility, command, Interpreter, Iterator, Mediator, Memento, Observer, State, Strategy, Template method, Visitor	**6**
7.	Software security design patterns	**6**
8.	Anti Patterns	**6**
Total		**45**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	**Quizzes**	**2-14**	**15**

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
2.	Projects	2-14	15
3.	Assignments	2-14	10
4.	Mid Term	7	20
5.	Final Exam	16-17	40

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1. References and Learning Resources

Essential References	• Seroukhov, S. (2024). *Microservices Design Patterns with Java: 70+ patterns for designing, building, and deploying microservices (English Edition)*. BPB Publications. • Gamma, E., Helm, R., Johnson, R., & Vlissides, J. (1995). *Design patterns: Elements of reusable object-oriented software*. Addison-Wesley Professional. ISBN 978-0201633613.
Supportive References	• Freeman, E., & Robson, E. (2024). *Head first JavaScript programming: A Learner's Guide to Modern JavaScript*. • Sarcar, V. (2018). *Java Design Patterns: A Hands-On Experience with Real-World Examples*. Apress.
Electronic Materials	
Other Learning Materials	

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Traditional Classroom
Technology equipment (projector, smart board, software)	Multimedia Projector
Other equipment (depending on the nature of the specialty)	N/A

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Students	Direct, Indirect
Effectiveness of Students assessment	Faculty, Peer reviewer	Direct, Indirect
Quality of learning resources	Faculty, Course coordinator	Direct, Indirect
The extent to which CLOs have been achieved	Course coordinator, Program management committee	Direct

Assessors (Students, Faculty, Program Leaders, Peer Reviewers, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	**SOFTWARE ENGINEERING DEPARTMENT COUNCIL**
REFERENCE NO.	**THE 17TH MEETING FOR THE ACADEMIC YEAR 1446H**
DATE	**22/04/2025**