I.   Course code and Title

CSE354	DESIGN PATTERNS

II.   Course Prerequisites

Course Code	Title
CSC241	Object Oriented Programming

III.   Instructor's Information

Full Name:	Aamir Shabbir Parre
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Office Hours & Location	09:00-17:30 (Mon - Friday) Faculty Area, 1st Floor, Academic Block-II.
Teaching Assistant (if any)	N/A

IV.   Course Composition

	Credit Hours	Weekly	Duration (hrs.)	Contact Hours
Lectures	2	2	1.0	3.0
Laboratories	1	2	3.0	6.0

V.   Course Description

Introduction to Design Patterns; Motivation for Design Patterns; Classification of Patterns; Design Pattern Catalogue; Describing Design Patterns, Selecting Design Patterns in a problem domain; Design Patterns Implementations, Design Patterns versus Toolkits and Frameworks; Design Patterns vs Design Principals, Design Patterns vs Architecture Patterns, UML for Design Patterns; Creative, Classification of Design Patterns: Creational, Structural and Behavioral.

VI.   Text book

1. Design Patterns: Elements of Reusable Object-oriented Software, Erich Gamma, Richard Helm, Ralph E. Johnson, John Vlissides, Pearson Education, 2015.

2. Adaptive Code: Agile coding with design patterns and SOLID principles
3. Design Patterns, Christopher G. Lasater, Wordware Publishing, Inc., 2010.

VII.　Reference books & Material

4. Object-Oriented Design and Patterns, Horstmann C. 2nd Edition, John Wiley & Sons, 2006.
5. Design Patterns in Java, Metsker S. J. & Wake W. C., Addison-Wesley, 2006.
6. Applying UML and Patterns: An Introduction to Object-Oriented Analysis and Design and Iterative Development

VIII.　Course Assessment

Evaluation methods	Theory Weight (%)[T]	Lab Weight(%)[L]
Quizzes	15	N/A
Assignments/ Programming Assignments	10	10
Mid Term Exam	25	25
Project	Replaces Assignments	Replaces Assignments.
Terminal Exam	50	50
Total	100	100

The course teacher may select any one of the above weightages as per the course credit hours.

IX.　Course Outline and Contents

Lecture	CDF Unit #	Topics Covered	Textbook Section
1.	1	Design Pattern Concepts. What pattern is what is not? Benefits and Motivations for Design Patterns	Metsker: Ch1, Burris: Ch1
2.	2	Pattern classification based on development stages, Design Pattern classification based on intent and purpose or scope.	Metsker: Ch1, Burris: Ch1, Gamma: Ch1, Ref. Material
3.	2	Design Pattern catalogue. Describing Design Patterns/ Design Patterns templates	Burris: Ch1, Gamma: Ch1 Ref. Material
4.	3	Selecting Design Patterns, What are GRASP Patterns What are SOLID Principles	Gamma: Ch1, Ref. Material, Adaptive Code, Part-III
5.	4	Using a Design Pattern, GRASP: Information Expert, Creator, Controller, Low Coupling, High Cohesion, Indirection Polymorphism, Pure Fabrication and Protected Variations	Gamma: Ch1, Ref. Material, Adaptive Code, Part-III
6	4	Guide to Notations, Designing for change, Design Patterns versus Toolkits and Frameworks.	Gamma: Ch1, Appendix B
7	5	Creative Design Patterns Overview	Gamma: Ch3, Ref. Material

8	5	Abstract Factory Design Pattern,	Gamma: Ch3, Ref. Material
9	5	Builder Design Pattern	Gamma: Ch3, Ref. Material
10	5	Factory Method Design Pattern	Gamma: Ch3, Ref. Material
11	5	Prototype Design Pattern	Gamma: Ch3, Ref. Material
12	5	Singleton Design Pattern	Gamma: Ch3, Ref. Material
13	6	Structural Design Patterns Overview	Gamma: Ch4, Ref. Material
14	6	Bridge Design Pattern	Gamma: Ch4, Ref. Material
15	6	Composite Design Pattern	Gamma: Ch4, Ref. Material
		Mid Term Examination	
16	6	Decorator Design Pattern	Gamma: Ch4, Ref. Material
17	6	Façade Design Pattern	Gamma: Ch4, Ref. Material
18	6	Flyweight Design Pattern	Gamma: Ch4, Ref. Material
19	6	Proxy Design Pattern	Gamma: Ch4, Ref. Material
20	7	Behavioral Design Patterns Overview	Gamma: Ch5, Ref. Material
21	7	Command Design Pattern	Gamma: Ch5, Ref. Material
22	7	Interpreter Design Pattern	Gamma: Ch5, Ref. Material
23	7	Iterator Design Pattern	Gamma: Ch5, Ref. Material
24	7	Mediator Design Pattern	Gamma: Ch5, Ref. Material
25	7	Memento Design Pattern	Gamma: Ch5, Ref. Material
26	7	Observer Design Pattern	Gamma: Ch5, Ref. Material
27	7	State Design Pattern	Gamma: Ch5, Ref. Material
28	7	Strategy Design Pattern	Gamma: Ch5, Ref. Material
29	7	Template Method Design Pattern	Gamma: Ch5, Ref. Material
30	7	Visitor Design Pattern	Gamma: Ch5, Ref. Material
		Terminal Examination	

X. Course Learning Outcomes (CLO)and Program Learning Outcomes

Upon completion of the course, students will be able to:

CLO	Description	PLO
C1	Explain underlying principles of design patterns and its classification.	k-1
C2	Demonstrate how to select appropriate design pattern for a given specific problem.	c-2
C3	Analyze the tradeoffs needs to be made when implementing a design pattern.	j-3
C4	Apply suitable design patterns when developing medium sized software.	k-2

Program Learning Outcomes (PLOs)

PLO	Description
c-2	Design a computer-based system, process, component, or program to meet desired needs.
j-3	Use of software engineering theory in the modeling and design of computer-based systems.
k-1	Ability to apply knowledge of the discipline to broadly-defined engineering technology activities.
k-2	Ability to apply techniques and skills of the discipline to broadly-defined engineering technology activities.

Relationship between CLOs and PLOs

Course Learning Outcomes	Unit of the Syllabus	Possible Artifacts	Level	Program Learning Outcomes
C1	1-2	Quiz, Assignment	L	k-1
C2	3-4	Assignment, Mid-Term Exam	L	c-2
C3	5-6	Quiz, Assignment, Mid-Term Exam	M	j-3
C4	4-7	Assignment, Quiz, Terminal Exam	H	k-2

XI.   Assessment Schedule - Tentative

Give your tentative assessment plan with submission due date.

S. No.	Artifact	Due Date	Remarks
1	Assignment 1	Week 2	
2	Quiz 1	Week 3	
4	Assignment 2	Week 7	
5	Quiz 2	Week 8	
6	Mid Term Examination	Week 11	
7	Assignment 3	Week 13	
8	Quiz 3	Week 13	
9	Assignment 4	Week 15	
10	Quiz 4	Week 15	
11	Terminal Examination	Week 17	

The course teacher may add quizzes, project or more assignment as he/she may deemed fit

XII.   Policy & Procedures

- **Attendance Policy:** Every student must attend 80% of the lectures delivered in this course and 80% of the practical/laboratory work prescribed for the respective courses. The students falling short of required percentage of attendance of lectures/seminars/practical/laboratory work, etc., shall not be allowed to appear in the terminal examination of this course and shall be treated as having failed this course.

- **Grading Policy:** The minimum pass marks for each course shall be 50%. Students obtaining less than 50% marks in any course shall be deemed to have failed in that course. The correspondence between letter grades, credit points, and percentage marks at CUI shall be as follows:

Grade	A	A-	B+	B	B-	C+	C	C-	D	F
Marks	90 - 100	85 - 89	80 - 84	75 - 79	70 - 74	65 - 69	60 - 64	55 - 59	50 - 54	<50
Cr. Point	4.0	3.7	3.3	3.0	2.7	2.3	2.0	1.7	1.3	0.0

- **Missing Exam:** No makeup will be allowed for any assessment activity i.e. quiz, assignment, sessional and final exam under any circumstance.

- **Academic Integrity:** All CUI policies regarding ethics apply to this course. The students are advised to discuss their grievances/problems with their counsellors or course instructor in a respectful manner.

- **Plagiarism Policy:** Plagiarism, copying and other anti-intellectual behaviour are prohibited by the university regulations. Violators may have to face serious consequences.