



COMSATS University Islamabad

Department of Computer Science

Course Syllabus

Course Information

Course Code: **CSE303**

Credit Hours: **3(2,1)**

Lab Hours/Week: **3**

Course Title: **Software Design and Architecture**

Lecture Hours/Week: **2**

Pre-Requisites: **CSC291- Software Engineering Concepts**

Catalogue Description:

This course provides understanding towards software design, architecture styles and design patterns. Topics include: Software Design Principles & Processes; Software Architectures; Middleware Architecture; Service Oriented Architecture; Micro Services Architecture; Software Architecture Processes & Documentation; Plan Driven Software Design; Designing with Patterns; and Components & Services.

Text and Reference Books

Textbooks:

1. Software Design: Creating Solutions for ill Structured Problems, David Budgen, CRC Press, 2021.
2. Essential Software Architecture, Ian Gorton, Springer – Verlag, 2011.
3. Software Architecture and Design Illuminated, Qian, K., Fu, X., Tao, L., & Xu, C., Jones & Bartlett Learning, MA, 2009.

Reference Books:

1. Engineering Software Products: An Introduction to Modern Software Engineering, Ian Sommerville, Global Edition Pearson Education, 2020.
2. Software Architecture in Practice, Bass L., Clements P. & Kazman R., Addison-Wesley, 2013.

Week wise Plan:

Lecture #	CDF Unit #	Topics Covered	Reading Material
1.	1	Software Design: Design Concepts, and Design Perspectives.	Budgen:Ch1
2.	1	Design Process; and Design Decisions.	Budgen:Ch2
3.	1	Managing the Design Process.	Budgen:Ch3
4.	1	Design Knowledge; and Design Principles.	Budgen:Ch4
5.	1	Empirical knowledge for Software Process & Design.	Budgen:Ch5
6.	2	Software Architecture & Design Space.	Qian:Ch1, Ch2
7.	2	Software Architecture & Modeling.	Qian:Ch3, Ch4
8.	2	Tools for Software Architecture & Design.	Ref. Material
9.	2	Architecture Styles; and Data Flow Architectures.	Qian:Ch5
10.	2	Data-Centered Architecture.	Qian:Ch6
11.	2	Hierarchical Architecture.	Qian:Ch7
12.	2	Implicit Asynchronous Communication Software Architecture.	Qian:Ch8
13.	2	Interaction-Oriented Software Architectures.	Qian:Ch9
14.	2	Distributed Architectures.	Qian:Ch10
15.	2	Component based Architectures.	Qian:Ch11
16.	2	Heterogeneous Architectures.	Qian:Ch12
17.	Mid Term Exam		
18.			

19.	2	Architecture of User Interfaces.	Qian:Ch13
20.	3	Middleware Architectures.	Gorton:Ch4
21.	3	Middleware Technologies.	Gorton:Ch4
22.	3	Service Oriented Architecture (SOA); Web Services, SOAP, and Messaging.	Gorton:Ch5
23.	3	UDDI; WSDL; and REST-Full Web Services.	Gorton:Ch5
24.	3	Message Brokers; and Business Process Orchestration.	Gorton:Ch6
25.	3	Integration Architecture Issues; and Enterprise Bus architecture.	Gorton:Ch6
26.	3	Micro-Services & Architecture.	Sommerville:Ch6
27.	4	Software Architecture Process.	Gorton:Ch7
28.	4	Documenting Software Architecture.	Gorton:Ch8
29.	5	Plan-Driven Software Design: SSA/SD, and SSADM.	Budgen:Ch13
30.	5	Incremental Design in Agile Software Development.	Budgen:Ch14
31.	6	Designing with Patterns.	Budgen:Ch15
32.	6	Designing with Components & Services.	Budgen:Ch16
Final Term Exam			

Student Outcomes (SOs)

S.#	Description
1	Apply knowledge of computing fundamentals, knowledge of a computing specialization, and mathematics, science, and domain knowledge appropriate for the computing specialization to the abstraction and conceptualization of computing models from defined problems and requirements
2	Identify, formulate, research literature, and solve <i>complex</i> computing problems reaching substantiated conclusions using fundamental principles of mathematics, computing sciences, and relevant domain disciplines
3	Design and evaluate solutions for <i>complex</i> computing problems, and design and evaluate systems, components, or processes that meet specified needs with appropriate consideration for public health and safety, cultural, societal, and environmental considerations
4	Create, select, adapt and apply appropriate techniques, resources, and modern computing tools to <i>complex</i> computing activities, with an understanding of the limitations
5	Function effectively as an individual and as a member or leader in diverse teams and in multi-disciplinary settings.

Course Learning Outcomes (CLO)

Sr.#	Unit #	Course Learning Outcomes	Blooms Taxonomy Learning Level	SO
CLO's for Theory				
CLO-1	1	Discuss software design principles and its processes.	<i>Understanding</i>	1
CLO-2	2	Demonstrate various software architecture styles and patterns using modeling tools.	<i>Applying</i>	2-4
CLO-3	3-4	Compare different software architectures and their processes.	<i>Analyzing</i>	1,2
CLO-4	5-6	Select an appropriate design pattern for an application.	<i>Analyzing</i>	2,4

CLO's for Lab											
CLO-5	2-6	Create an application using an appropriate design pattern in a team environment.		Creating	2-5						
CLO Assessment Mechanism											
Assessment Tools	CLO-1	CLO-2	CLO-3	CLO-4	CLO-5						
Quizzes	Quiz 1	Quiz 2	Quiz 3 & 4	-	-						
Assignments	-	Assignment 1	Assignment 2 & 3	Assignment 4	Lab Assignments						
Mid Term Exam	Mid Term Exam	Mid Term Exam	-	-	-						
Final Term Exam	Final Term Exam										
Projects	-	-	-	-	Lab Project						
Policy & Procedures											
<ul style="list-style-type: none">Attendance Policy: Every student must attend 80% of the lectures as well as laboratory in this course. The students falling short of required percentage of attendance of lectures/laboratory work, is not allowed to appear in the terminal examination.Course Assessment:											
	Quizzes	Assignments	Mid Term Exam	Terminal Exam	Total						
Theory (T)	15	10	25	50	100						
Lab (L)	-	25	25	50	100						
Final Marks (T+L)	(T/100) *67 + (L/100) *33										
<ul style="list-style-type: none">Grading Policy: The minimum passing marks for each course is 50% (In case of LAB; in addition to theory, student is also required to obtain 50% marks in the lab to pass the course). The correspondence between letter grades, credit points, and percentage marks at CUI is as follows:											
Grade	A	A-	B+	B	B-	C+	C	C-	D+	D	F
Marks	>= 85	80 - 84	75 - 79	71 - 74	68 - 70	64 - 67	61 - 63	58 - 60	54 - 57	50-53	< 50
Cr. Point	3.67-4.00	3.34-3.66	3.01-3.33	2.67-3.00	2.34-2.66	2.01-2.33	1.67-2.00	1.31-1.66	1.01-1.30	0.10-1.00	0.00
<ul style="list-style-type: none">Missing Exam: No makeup exam will be given for final exam under any circumstance. When a student misses the mid-term exam for a legitimate reason (such as medical emergencies), his grade for this exam will be determined based on the Department policy. Further, the student must provide an official excuse within one week of the missed exam.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 any other dishonest behaviour is prohibited by the rules and regulations of CUI. Violators will face serious consequences.											