



**BITS Pilani**  
Pilani | Dubai | Goa | Hyderabad

## **BIRLA INSTITUTE OF TECHNOLOGY & SCIENCE, PILANI WORK INTEGRATED LEARNING PROGRAMMES**

### **COURSE HANDOUT**

#### **Part A: Content Design**

<b>Course Title</b>	OBJECT ORIENTED ANALYSIS AND DESIGN
<b>Course No(s)</b>	SS ZG514 / SE ZG512
<b>Credit Units</b>	4 (1+ 1+ 2) 1 unit for class room hours, 1 unit for project hours, 2 units for student preparation. Typically 1 unit translates to 32 hours
<b>Course Author</b>	PARMANANDA BARIK
<b>Version No</b>	
<b>Date</b>	

#### **Course Objectives**

No	Objective
CO1	Understand Object orientation concepts, theories and principles;
CO2	Understand Fundamental concepts of the object model; classes, objects, methods and messages, encapsulation and inheritance, interface and implementation, reuse and extension of classes, inheritance and polymorphism;
CO3	Understand the process of object-oriented requirements specification, analysis and design; Notations for object-oriented analysis and design; Case studies and applications using some object oriented programming languages

#### **Text Book(s)**

T1	Larman, C., Applying UML and Patterns, Pearson Education, 2 <sup>nd</sup> Ed., 2002.
T2	Erich Gamma et al., Design Patterns: Elements of Reusable Object-Oriented Software, 1994

#### **Reference Book(s) & other resources**

R1	Martin, Robert C., Agile Software Development, Principles, Patterns, and Practices, 2002
R2	Ambler, Scott W., The Elements of UML(TM) 2.0 Style, Cambridge University Press, 2005
R3	<a href="http://www.uml-diagrams.org">http://www.uml-diagrams.org</a>
R4	<a href="http://www.martinfowler.com">http://www.martinfowler.com</a>
R5	<a href="http://www.objectmentor.com">http://www.objectmentor.com</a>

#### **Content Structure**

No	Title of the Module
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M1	Introduction SDLC Models - Waterfall, Unified Process, Agile Introduction to Object Oriented Analysis & Design
M2	Starting with Object Oriented Analysis : Building Use Case Model
M3	Creating System Level Artefacts : Domain Model, SSD & Operation Contracts
M4	Getting into Object Oriented Design : Refinements in Use Cases & Domain Model, Interaction Diagrams, State Transition Diagram, Activity Diagram
M5	Visibility between Objects, Class Diagram, Package Diagram
M6	Design Patterns : GRASP, Additional Patterns, SOLID Design Principles
M7	Design Patterns : Some Gang Of Four (GoF) Patterns
M8	Design Patterns : Further Gang Of Four (GoF) Patterns

### **Learning Outcomes:**

No	Learning Outcomes
LO1	Knowledge of Unified Process
LO2	Knowledge of Unified Modeling Language
LO3	The student should be able to apply the principles of object-oriented concepts using the Unified Process and Unified Modeling Language (UML) to any software development effort.
LO4	Ability to recognize Design Patterns in a Software Product.
LO5	Ability to recognize situations and fit software solutions to the problem.

## **Part B: Contact Session Plan**

<b>Academic Term</b>	Second Semester 2022-2023
<b>Course Title</b>	<b>OBJECT ORIENTED ANALYSIS AND DESIGN</b>
<b>Course No</b>	SS ZG514 / SE ZG512
<b>Lead Instructor</b>	PARMANANDA BARIK

### **Glossary of Terms**

- Contact Hour (CH) stands for a hour long live session with students conducted either in a physical classroom or enabled through technology. In this model of instruction, instructor led sessions will be for 22 CH.
  - Pre CH = Self Learning done prior to a given contact hour
  - During CH = Content to be discussed during the contact hour by the course instructor
  - Post CH = Self Learning done post the contact hour
- Contact Hour (CS) stands for a two-hour long live session with students conducted either in a physical classroom or enabled through technology. In this model of instruction, instructor led sessions will be for 11 CS.
  - Pre CS = Self Learning done prior to a given contact session
  - During CS = Content to be discussed during the contact session by the course instructor

- c. Post CS = Self Learning done post the contact session
- 3. RL stands for Recorded Lecture or Recorded Lesson. It is presented to the student through an online portal. A given RL unfolds as a sequences of video segments interleaved with exercises
- 4. SS stands for Self-Study to be done as a study of relevant sections from textbooks and reference books. It could also include study of external resources.
- 5. LE stands for Lab Exercises
- 6. HW stands for Home Work.
- 7. M stands for module. Module is a standalone quantum of designed content. A typical course is delivered using a string of modules. M2 means module 2.

### **Teaching Methodology (Flipped Learning Model)**

The pedagogy for this course is centered around flipped learning model in which the traditional class-room instruction is replaced with recorded lectures to be watched at home as per the student's convenience and the erstwhile home-working or tutorials become the focus of classroom contact sessions. Students are expected to finish the home works on time.

### **Contact Session Plan**

- Each Module (M#) covers an independent topic and module may encompass more than one Recorded Lecture (RL).
- **Contact Sessions (2hrs each week)** are scheduled alternate weeks after the student watches all Recorded Lectures (RLs) of the specified Modules (listed below) during the previous week
- In the flipped learning model, Contact Sessions are meant for in-classroom discussions on cases, tutorials/exercises or responding to student's questions/clarification--- may encompass more than one Module/RLs/CS topic.
- Contact Session topics listed in course structure (numbered CSx.y) may cover several RLs; and as per the pace of instructor/students' learning, the instructor may take up more than one CS topic during each of the below sessions.

### **Detailed Structure**

**Introductory Video/Document:** << *Introducing the faculty, overview of the course, structure and organization of topics, guidance for navigating the content, and expectations from students*>>

- Each of the sub-modules of **Recorded Lectures** (RLx.y) shall delivered via **30 – 60mins videos** followed by:
- **Contact session** (CSx.y) of 2Hr each for illustrating the concepts discussed in the videos with exercises, tutorials and discussion on case-problems (wherever appropriate); contact sessions (CS) may cover more than one recorded-lecture (RL) videos.

## Course Contents

### Contact Hour 1

#### **M0: Introduction**

Time	Type	Sequence	Content Reference
Pre CH		Not Applicable	
During CH	CH1.1	CS0.1 = Explanation of the material to be covered in this course	
Post CH	SS1	SS0.1 = Read Preface from Text: T1	
	HW1	HW0.1 = Visit <a href="http://www.uml-diagrams.org">http://www.uml-diagrams.org</a>	
	LE1	None	
	QZ1	QZ0.1 = List the main diagram types available under uml 2.0	
Lab Reference			

### Contact Hour 2

#### **M0: Introduction**

Time	Type	Sequence	Content Reference
Pre CH	RL2.1	None	
During CH	CH2	CS0.2 = Review of Object Oriented Programming	
Post CH	SS2		
	HW2		
	LE2		
	QZ2		
Lab Reference			

### Contact Hour 3

#### **M1: SDLC Models: Waterfall, Unified Process, Agile**

Time	Type	Sequence	Content Reference
Pre CH	RL3.1	RL1.1.1 = Programming Paradigms – Procedural Programming, Object Oriented Programming RL1.1.2 = What is Software Development Life Cycle (SDLC)? RL1.1.3 = Waterfall Model: How it works? When to apply	

		waterfall model?	
	RL3.2	RL1.2.1 = Overview of Unified Process RL1.2.2 = UP : An Iterative & Evolutionary Development RL1.2.3 = UP Phases & Disciplines	
During CH	CH3	CS1.1.1 = Explain with example difference between Procedural and Object Oriented Programming. Highlight the fact that, maintainability of software is easy in Object Oriented software. CS1.1.2 = SDLC Phases, Role of Analyst, Designer, Programmer and Tester CS1.1.3 = Waterfall Model : How it is good or bad? CS1.1.4 = Briefing of all other models like Spiral Model, Incremental Model, V-Model etc. CS1.1.5 = UP Model, Phases & Disciplines, How it is different than Waterfall and other models?	
Post CH	SS3	SS1.1 = Read Ch 1 and Ch 2 of Text Book: T1	
	HW3	HW1.1 = Download staruml from the Official Site. <a href="http://staruml.io/">http://staruml.io/</a>	
	LE3	LE1.1 = Read about the capability of staruml.	
	QZ3	QZ1.1 = Write down the names of 11 kinds of uml diagrams supported by startuml.	
Lab Reference			

#### **Contact Hour 4**

##### **M1: SDLC Models: Waterfall, Unified Process, Agile**

Time	Type	Sequence	Content Reference
Pre CH	RL4.1	RL1.3.1 = Agile Principles & Manifesto RL1.3.2 = Xtreme Programming (XP) RL 1.3.3 = Scrum RL 1.3.4 = Agile Modelling RL 1.3.5 = Test Driven Development RL 1.3.6 = Refactoring & Continuous Integration	
	RL4.2	RL1.4.1 = Introduction to OOA & OOD? RL1.4.2 = Overview of UML RL1.5.1 = Concept of Class & Object RL1.5.2 = Class Relationships in UML	
During CH	CH4	CS1.2.1 = Agile Model, Agile Manifesto, Various Agile approaches like Scrum, XP, TDD, Refactoring. CS1.2.2 = Give example of TDD and Refactoring in case of coding. CS1.2.3 = Concept of Class, Object and their representation in UML	

Post CH	SS4		
	HW4	Browse the internet and find out very good video explaining Test Driven Development approach with some source code.	
	LE4		
	QZ4		
Lab Reference			

### **Contact Hour 5**

#### **M2: Starting with Object Oriented Analysis: Building Use Case Model**

Time	Type	Sequence	Content Reference
Pre CH	RL5.1	RL2.1.1 = Point of Sale (PoS) Case Study RL2.1.2 = Requirement Categories – Functional & Non Functional Requirements RL2.1.3 = What is Use Case Diagram & Use Cases?	
	RL5.2	RL2.2.1 = Drawing Use Case Diagram for PoS	
During CH	CH5	CS2.1.1 = Give mall example as PoS case study, First step in OOA is requirement gathering and requirement categorization (Functional & Non Functional) CS2.1.2 = Explain difference between Use Case Diagram and Use Cases. Use Case Diagram is pictorial and Use Case is textual artefact. CS2.1.3 = Demonstrate how Use Case Diagram can be drawn for PoS Case Study.	
Post CH	SS5		
	HW5		
	LE5		
	QZ5		
Lab Reference			

### **Contact Hour 6**

#### **M2: Starting with Object Oriented Analysis: Building Use Case Model**

Time	Type	Sequence	Content Reference
Pre CH	RL6.1	RL2.3.1 = Types of Use Cases RL2.3.2 = Write Fully Dressed Use Case for one scenario in PoS System. RL2.3.3 = Styles of Use Cases	

During CH	CH6	CS2.2.1 = Explain Fully dressed use case syntax CS2.2.2 = Demonstrate writing Fully Dressed Use Case for Process Sale scenario in PoS case study.	
Post CH	SS6		
	HW6	HW2.1 = Go thru the Library Case study provided as a part of Courseware Kit. Draw Use Case Diagram and write fully dressed Use Case for any one scenario from Library Case Study.	
	LE6		
	QZ6		
Lab Reference			

### **Contact Hour 7**

#### **M3: Creating System Level Artefacts: Domain Model, SSD & Operation Contracts**

Time	Type	Sequence	Content Reference
Pre CH	RL7.1	RL3.1.1 = What is Domain Model? RL3.1.2= How Domain Model is represented in UML? RL3.1.3 = Identification of Domain Concepts from Use Case RL3.1.4 = Identification of relationship among domain concepts  RL3.1.5 = Finding multiplicity among Domain Concepts RL3.1.6= Adding attributes to Domain Model RL3.1.7= Significance of Domain Model	
During CH	CH7	CS3.1.1 = Explain how Domain Concepts are different than software classes, how domain concepts to be identified? CS3.1.2 = How to identify Associations and Multiplicity among domain concepts CS3.1.3 = Explain how to add attributes to Domain Model? CS3.1.4 = Demonstrate drawing complete Domain Model for PoS System	
Post CH	SS7		
	HW7		
	LE7	LE3.1 = Draw Domain Model for Library Case Study.	
	QZ7		
Lab Reference			

### **Contact Hour 8**

#### **M3: Creating System Level Artefacts: Domain Model, SSD & Operation Contracts**

Time	Type	Sequence	Content
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			Reference
Pre CH	RL8.1	RL3.2.1 = What is System Sequence Diagram? RL3.2.2 = Drawing SSD for PoS RL3.2.3= Significance of SSD	
	RL8.2	RL3.3.1 = What is Operation Contract? RL 3.3.2= Represent Operation Contract in UML RL3.3.3 = Writing Operation Contract for PoS	
During CH	CH8	CS3.2.1 = Explain significance of SSD, Operation Contracts CS3.2.2 = Demonstrate drawing SSD and writing operation contract for PoS System	
Post CH	SS8		
	HW8		
	LE8	LE3.2 = Draw SSD for any once scenario of Library Case Study Pick up any LE3.3 = one operation from SSD and write operation contract for the same.	
	QZ8		
Lab Reference			

### **Contact Hour 9**

#### **M4: Getting into Object Oriented Design : Refinements in Use Cases & Domain Model, Interaction Diagrams, State Transition Diagram, Activity Diagram**

Time	Type	Sequence	Content Reference
Pre CH	RL9.1	RL4.1.1 = Relating Use Cases : includes, extends relationships RL4.1.2 = Refining Domain Model : Derived Attributes RL4.1.3 = Refining Domain Model : Association Classes	
	RL9.2	R RL4.2.1 = What is Interaction Diagram? RL4.2.2 = Types of Interactions Diagrams RL4.2.3 = Representation of Interaction Diagrams in UML RL4.2.4= Drawing Interaction Diagrams for PoS	
During CH	CH9	CS4.1.1 = Explain how transition happens from Object Oriented Analysis to Object Oriented Design? How OOA artefacts gets utilized in OOD? CS4.1.2 = Refinements done by Designer in Use Case Model & Domain Model CS4.1.3 = Demonstrate refinements in already created Use Case Model and Domain Model for PoS System.	
Post CH	SS9		



	HW9		
	LE9	LE4.1 = Draw Sequence, Collaboration diagrams for any one scenario in Library Case Study	
	QZ9		
Lab Reference			

### **Contact Hour 10**

#### **M4: Getting into Object Oriented Design : Refinements in Use Cases & Domain Model, Interaction Diagrams, State Transition Diagram, Activity Diagram**

Time	Type	Sequence	Content Reference
Pre CH	RL10.1	RL4.1.1 = Relating Use Cases : includes, extends relationships RL4.1.2 = Refining Domain Model : Derived Attributes RL4.1.3 = Refining Domain Model : Association Classes	
	RL10.2	RL4.2.1 = What is Interaction Diagram? RL4.2.2 = Types of Interactions Diagrams RL4.2.3 = Representation of Interaction Diagrams in UML RL4.2.4 = Drawing Interaction Diagrams for PoS	
During CH	CH10	CS4.2.1 = Explain how an Interaction Diagram plays an important role in Blueprint of the software? Types and syntax of Interaction Diagrams? CS4.2.2 = Demonstrate drawing Sequence Diagram, Collaboration Diagram for any one scenario of PoS System CS4.2.3 = State Transition Diagram Syntax & Activity Diagram Syntax. What is different between them? CS4.2.4 = Demonstrate drawing State Chart Diagram, Activity Diagram for PoS System.	
Post CH	SS10		
	HW10	HW4.1 = Refine the Domain Model and Use Case Model you created for Library Case Study.	
	LE10	LE4.2 = Draw State Chart Diagram for Library as a whole system. Pick up any one key object in Library system and showcase how state transition happens for this object in any specific scenario. LE4.3 = Pick up any one scenario in Library System and draw an Activity Diagram for the same.	
	QZ10		
Lab Reference			

**Contact Hour 11****M5: Visibility between Objects, Class Diagram, Package Diagram**

Time	Type	Sequence	Content Reference
Pre CH	RL11.1	Review	
During CH	CH11	To be announced	
Post CH	SS11		
	HW11		
	LE11		
	QZ11		
Lab Reference			

**Contact Hour 12****M5: Visibility between Objects, Class Diagram, Package Diagram**

Time	Type	Sequence	Content Reference
Pre CH	RL12.1	Review	
During CH	CH12	To be announced	
Post CH	SS12		
	HW12		
	LE12		
	QZ12		
Lab Reference			

**Contact Hour 13**

Time	Type	Sequence	Content Reference
Pre CH	RL13.1	RL5.1.1 = What is Visibility among Objects RL 5.1.2= Significance of finding Visibility RL5.1.3 = Types of Visibility – Attribute, Parameter, Local & Global Visibility RL5.1.4 = Attribute Visibility RL5.1.5 = Parameter Visibility RL5.1.6 = Local Visibility RL 5.1.7= Global Visibility	
	RL13.2	RL5.2.1 = Use Domain Model to draw Class Diagram RL5.2.2 = Representing Class in UML	

		RL5.2.3 = Relationship among Classes in Class Diagram RL5.2.4 = Guidelines to draw Class Diagram RL5.2.5 = Draw Class Diagram for PoS System	
During CH	CH13	CS5.1.1 = Concept & Significance of Visibility among Objects CS5.1.2 = Types of Visibility with source code example CS1.1.3 = Transition from Domain Model to Class Diagram	
Post CH	SS13		
	HW13	LE5.1 = Draw the Class and Package diagrams for Library System	
	LE13	RL5.1.1 = What is Visibility among Objects RL 5.1.2= Significance of finding Visibility RL5.1.3 = Types of Visibility – Attribute, Parameter, Local & Global Visibility RL5.1.4 = Attribute Visibility RL5.1.5 = Parameter Visibility RL5.1.6 = Local Visibility RL 5.1.7= Global Visibility	
	QZ13	RL5.2.1 = Use Domain Model to draw Class Diagram RL5.2.2 = Representing Class in UML RL5.2.3 = Relationship among Classes in Class Diagram RL5.2.4 = Guidelines to draw Class Diagram RL5.2.5 = Draw Class Diagram for PoS System	
Lab Reference			

#### **Contact Hour 14**

Time	Type	Sequence	Content Reference
Pre CH	RL14.1	RL5.3.1 = Grouping Classes in Package Diagram RL5.3.2 = Level & Partitions for Package Diagram RL5.3.3 = Showing Dependency in Package Diagram RL5.3.4= Guidelines for Package Diagram RL5.3.5= Drawing Package Diagram for PoS System	
During CH	CH14	CS5.2.1 = Drawing Class Diagram leveraging Domain Model drawn by an Analyst CS5.2.2 = Demonstrate drawing Class Diagram for PoS System, show all types of visibility in Class Diagram CS5.2.3= Drawing package class diagram for PoS System	
Post CH	SS14	HW5.1 = Browse the Internet and find out code snippets which will indicate all 4 types of visibilities, i.e. Attribute, Parameter, Local & Global visibility	
	HW14	LE5.2 = Show all types of visibility in Class & Package Diagrams	

	LE14		
	QZ14	RL5.3.1 = Grouping Classes in Package Diagram RL5.3.2 = Level & Partitions for Package Diagram RL5.3.3 = Showing Dependency in Package Diagram RL5.3.4 = Guidelines for Package Diagram RL5.3.5 = Drawing Package Diagram for PoS System	
Lab Reference			

### **Contact Hour 15**

#### **M7: Design Patterns: Gang Of Four (GoF) Patterns**

Time	Type	Sequence	Content Reference
Pre CH	RL15.1	RL6.1.1 = What is Pattern? What is Design Pattern? RL6.1.2 = Types of Design Patterns : GRASP, GoF RL6.1.3 = Advantages of using Design Patterns RL6.1.4 = Design Patterns : Designer's and Programmer's perspective	
	RL15.2	RL6.2.1 = What is Responsibility Assignment Problem? RL6.2.2 = GRASP Patterns – Information Expert, Controller, Creator, Low Coupling & High Cohesion  RL6.2.3 = Information Expert Pattern – Problem & Solution RL6.2.4 = Application of Information Expert in PoS System RL6.2.5 = Controller Pattern – Problem & Solution RL6.2.6 = Application of Controller Pattern in PoS System RL6.2.7 = Creator Pattern – Problem & Solution RL6.2.8 = Application of Creator Pattern in PoS System	
	RL15.3	RL 6.3.1= Low Coupling Pattern – Problem & Solution RL6.3.2 = Application of Low Coupling to optimize the design  RL6.3.3 = High Cohesion Pattern – Problem & Solution RL6.3.4 = Application of High Cohesion Pattern to optimize the design	
During CH	CH15	CS6.1.1 = Explain meaning of Patterns, Design Patterns and how they matter for Programmers and Designers?  CS6.1.2 = Introduce 5 GRASP Patterns, problem and application of each pattern.  CS6.1.3 = Demonstrate the use of each of the GRASP pattern for PoS System	
Post CH	SS15		
	HW15		
	LE15		
	QZ15		

Lab Reference			
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### **Contact Hour 16**

#### **M7: Design Patterns: Gang Of Four (GoF) Patterns**

Time	Type	Sequence	Content Reference
Pre CH	RL16.1	RL6.4.1 = Additional Patterns : Polymorphism, Pure Fabrication, Indirection & Protected Variation RL 6.4.2= Polymorphism Pattern – Problem & Solution RL6.4.3 = Application of Polymorphism Pattern to optimize the design RL6.4.4 = Pure Fabrication Pattern – Problem & Solution RL6.4.5 = Application of Pure Fabrication Pattern to optimize the design RL 6.4.6= Indirection Pattern – Problem & Solution RL6.4.7 = Application of Indirection Pattern to optimize the design RL6.4.8 = Protected Variation Pattern – Problem & Solution RL6.4.9 = Application of Protected Variation Pattern to optimize the design	
	RL16.2	RL6.5.1= Introduction to SOLID Design Principles RL6.5.2= Single Responsibility Principle (SRP) RL6.5.3= Open-Closed Principle (OCP) RL6.5.4= Liskov Substitution Principle (LSP) RL6.5.5= Interface Segregation Principle (ISP) RL6.5.6= Dependency Inversion Principle (DIP)	
During CH	CH16	CS6.2.1 = Some more patterns (3 Ps and 1 I) and their application CS6.2.2 = Demonstrate how these patterns will be used in PoS System CS6.2.3= Overview of all Design Principles and their usage in real time examples	
Post CH	SS16		
	HW16	HW6.1 = Find out scope of applicability of all 4 Design Principles in Library Case Study.	
	LE16	LE6.1 = Refer other artefacts generated (Interaction Diagram, Class Diagram etc.) for Library System and identify how above learned patterns are getting applied over there. Make sure to cover each pattern studied.	
	QZ16		
Lab Reference			

**Contact Hour 17****M7: Design Patterns: Gang Of Four (GoF) Patterns**

Time	Type	Sequence	Content Reference
Pre CH	RL17.1	RL 7.1.1= Adapter Pattern – Problem & Solution RL7.1.2 = Application of Adapter Pattern to PoS RL 7.1.3= Factory Pattern – Problem & Solution RL7.1.4 = Application of Factory Pattern to PoS.	
During CH	CH17	CS7.1.1 = Introducing GoF Patterns CS7.1.2 = Explain Adapter & Factory Patterns with help of coding example CS7.1.3 = Showcase the use of above patterns in PoS System	
Post CH	SS17		
	HW17		
	LE17		
	QZ17		
Lab Reference			

**Contact Hour 18****M7: Design Patterns: Gang Of Four (GoF) Patterns**

Time	Type	Sequence	Content Reference
Pre CH	RL18.1	RL 7.2.1= Singleton Pattern – Problem & Solution RL7.2.2 = Application of Singleton Pattern to PoS. RL 7.2.3= Strategy Pattern – Problem & Solution RL7.2.4 = Application of Strategy Pattern to PoS.	
During CH	CH18	CS7.2.1 = Explain Singleton & Strategy Patterns with help of coding example CS7.2.2 = Showcase the use of above patterns in PoS System	
Post CH	SS18		
	HW18		
	LE18	LE7.1 = Refer other artefacts generated (Interaction Diagram, Class Diagram etc.) for Library System and identify how above learned patterns are getting applied over there. Make sure to cover each pattern studied.	
	QZ18		
Lab Reference			

**Contact Hour 19**

Time	Type	Sequence	Content Reference
Pre CH	RL19.1	RL 8.1.1= Composite Pattern – Problem & Solution RL8.1.2 = Application of Composite Pattern to PoS. RL 8.1.3= Facade Pattern – Problem & Solution RL8.1.4 = Application of Facade Pattern to PoS.	
During CH	CH19	CS8.1.1 = Explain Composite & Facade Patterns with help of coding example CS8.1.2 = Showcase the use of above patterns in PoS System	
Post CH	SS19		
	HW19		
	LE19		
	QZ10		
Lab Reference			

**Contact Hour 20**

Time	Type	Sequence	Content Reference
Pre CH	RL20.1	RL 8.2.1= Observer/Delegation Event/Publish Subscribe Pattern – Problem & Solution RL8.2.2 = Application of Publish Subscribe Pattern to PoS.	
During CH	CH20	CS8.2.1 = Explain concept of event source and event handler. How it is called as Observer as well as Publish-Subscribe Pattern? CS8.2.2 = Explain above pattern by means of source code & event handling in UI CS8.2.3 = Showcase the use of above pattern in PoS System	
Post CH	SS20	SS8.1 = Find out the list of GoF Patterns which you have not studied. Make list of such patterns in problem and solution format.	
	HW20		
	LE20	LE8.1 = Refer other artefacts generated (Interaction Diagram, Class Diagram etc.) for Library System and identify how above learned patterns are getting applied over there. Make sure to cover each pattern studied.	
	QZ20		
Lab Reference			

**Contact Hour 21**

Time	Type	Sequence	Content Reference
Pre CH	RL21.1	Review	
During CH	CH21	To be announced	
Post CH	SS21		
	HW21		
	LE21		
	QZ21		
Lab Reference			

**Contact Hour 22**

Time	Type	Sequence	Content Reference
Pre CH	RL22.1	Review	
During CH	CH22	To be announced	
Post CH	SS22		
	HW22		
	LE22		
	QZ22		
Lab Reference			



### Lab work: Detailed Plan

Lab Objective
<p>For Library scenario described below (at the end of this document), do the following using <b>Star UML tool</b> where ever possible:</p> <ol style="list-style-type: none"><li>1. Requirement gathering<ol style="list-style-type: none"><li>a. Identify the actors and their needs</li><li>b. Draw Use case diagram</li><li>c. Write use cases for Issue book &amp; Return book</li></ol></li><li>2. Analysis<ol style="list-style-type: none"><li>a. Draw the domain model for the system</li><li>b. Draw activity diagram for Issue book</li><li>c. Identify the states of a book and draw a state transition diagram for Book</li></ol></li><li>3. Design<ol style="list-style-type: none"><li>a. Draw sequence diagrams to realize the use cases “Issue book” and “Return book”</li><li>b. Draw Software Class diagram based the analysis and design done</li></ol></li><li>4. Evaluate quality of design<ol style="list-style-type: none"><li>a. Given a software class diagram, evaluate the quality of the design based on the characteristics such as Coupling, cohesion, maintainability, etc.</li></ol></li></ol>

### Work integrated activities: Detailed plan

Activity description
<p>Choose a system developed in your organization. (Make sure the system is not chosen by any other group).</p> <ol style="list-style-type: none"><li>1. Understand the purpose, functions &amp; features supported by the system. (You may have to meet &amp; discuss with the team that has developed the system).</li></ol> <p>Submit a 1-page write up. <b>Duration: 2 weeks</b></p> <ol style="list-style-type: none"><li>2. Understand the analysis &amp; design of the system. (You may have to look at the design documents, speak to architect / designer).</li></ol> <p>Submit Domain model, System sequence diagram for 4 main use cases, Sequence diagram or Collaboration diagram for 4 main operations and Software class diagram consisting of main classes. <b>Duration: 3 weeks</b></p> <ol style="list-style-type: none"><li>3. Make a presentation consisting of<ul style="list-style-type: none"><li>● System overview</li><li>● System analysis</li><li>● Software design</li><li>● Your observations on the quality of design (characteristics of good design)</li><li>● Your recommendations to improve the design</li></ul><b>Duration: 2 weeks</b></li></ol>

### **Project work: Detailed Plan**

**Objective of the project:** Apply OOAD techniques to design of software

**Tasks to be performed** by the students, in groups of 4:

1. Briefly describe a software application that you want to develop (1 week)
2. Define the requirements using Use case diagram and Use cases (1 week)
3. Analyze the requirements and create Domain model, State diagrams (2 weeks)
4. Draw the Sequence diagram for key use cases (2 weeks)
5. Draw the Software class diagram for the application (1 week)
6. Discuss: What were the key learnings from this assignment?

**Duration of the project:** 7 weeks

#### **Appendix:**

Product description document should contain:

1. Name of the product:
2. Purpose of the product:
3. Target users:
4. What pain point does the product try to alleviate:
5. Functions supported by the product:

### **Case studies: Detailed Plan**

Case study No	Case study Objective	Case study Sheet Access URL
1	Demonstrate real life Use cases	
2	Demonstrate real life artifacts such as Swim lane diagram, activity diagram and state diagrams	
3	Demonstrate real life Sequence diagrams	
4	Demonstrate real life Software Class diagram	

#### **Evaluation Scheme:**

Legend: EC = Evaluation Component; AN = After Noon Session; FN = Fore Noon Session

No	Name	Type	Duration	Weight	Day, Date, Session, Time
EC-1	Quiz-I/ Assignment-I	Online	-	5%	February 13-23, 2023
	Quiz-II	Online		5%	March 20-30, 2023
	Lab / Assignment	Online		10%	April 20-30, 2023
EC-2	Mid-Semester Test	Open Book	2 hours	30%	Sunday, 12/03/2023 (FN)
EC-3	Comprehensive Exam	Open Book	2 ½ hours	50%	Sunday, 21/05/2023 (FN)

**Note** - Evaluation components can be tailored depending on the proposed model.

**Important Information:**

Syllabus for Mid-Semester Test (Open Book): Topics in CS 1-5.

Syllabus for Comprehensive Exam (Open Book): All topics given in plan of study

Evaluation Guidelines:

1. For Closed Book tests: No books or reference material of any kind will be permitted. Laptops/Mobiles of any kind are not allowed. Exchange of any material is not allowed.
2. For Open Book exams: Use of prescribed and reference text books, in original (not photocopies) is permitted. Class notes/slides as reference material in filed or bound form is permitted. However, loose sheets of paper will not be allowed. Use of calculators is permitted in all exams. Laptops/Mobiles of any kind are not allowed. Exchange of any material is not allowed.
3. If a student is unable to appear for the Regular Test/Exam due to genuine exigencies, the student should follow the procedure to apply for the Make-Up Test/Exam. The genuineness of the reason for absence in the Regular Exam shall be assessed prior to giving permission to appear for the Make-up Exam. Make-Up Test/Exam will be conducted only at selected exam centres on the dates to be announced later.

It shall be the responsibility of the individual student to be regular in maintaining the self-study schedule as given in the course handout, attend the lectures, and take all the prescribed evaluation components such as Assignment/Quiz, Mid-Semester Test and Comprehensive Exam according to the evaluation scheme provided in the handout.