Uka Tarsadia University

B. Tech.
CSE / CSE (CC) / CE (SE)
Semester VII

Program Elective - V
OBJECT ORIENTED SOFTWARE DESIGN
CE6014

EFFECTIVE FROM July-2024

Syllabus version: 1.00

Subject Code	Subject Title
CE6014	Object Oriented Software Design

Teaching Scheme				Examination Scheme				
Hours		Credits		Theory Marks		Practical Marks		Total Marks
Theory	Practical	Theory	Practical	Internal	External	Internal	External	
3	2	3	1	40	60	20	30	150

Objectives of the course:
- To deliver understanding of object-oriented principal, methodology and analysis for software design and developments projects.
- To demonstrate object relationship analysis, interface design principals, enabling them to effectively design and develop object-oriented software systems.

Course outcomes:
Upon completion of the course, the student shall be able to,

CO1: Understand object-oriented philosophy in software design.

CO2: Learn Rumbaugh, Booch and Jacobson's methodologies.

CO3: Explore approaches for identifying classes, including the noun phrase and common class patterns approaches.

CO4: Apply different types of object relationship including associations, super-sub relationship and aggregation.

CO5: Explore distributed objects computing and its role in the next generation of client-server computing.

CO6: Design user interfaces through a systematic process, while understanding the impact of object-oriented principles on software quality assurance and testing.

Sr. No.	Topics	Hours
	Unit – I	
1	**Introduction to Object-Oriented Design:** An overview of Object-Oriented systems development, Object basics, Object-Oriented system development life cycle – Software development process, Building high-quality software, Object-Oriented systems development – A use case driven approach, Reusability.	6

	Unit – II	
2	**Object-Oriented Methodologies and Model Management:** Introduction: Toward unification – Too many methodologies, Survey of some of the Object-Oriented methodologies, Rumbaugh et al.'s object modelling technique, The Booch methodology, The Jacobson et al.'s methodologies, Patterns, Frameworks, The unified approach, Model management – Packages and model organization, UML extensibility, UML meta-model.	8
	Unit – III	
3	**Identifying Use Cases :** Why analysis is a difficult activity?, Business object analysis – Understanding the business layer, Use-case driven object- oriented analysis – The unified approach, Business process modelling, Use-case model, Developing effective documentation, Case study – Analysing the ViaNet bank ATM, The use-case driven process. **Object Analysis Classification:** Classifications theory, Approaches for identifying classes, Noun phrase approach, Common class patterns approach, Use-case driven approach – Identifying classes and their behaviours through sequence collaboration modelling, Classes responsibilities and collaborators, Naming classes.	8
	Unit – IV	
4	**Identifying Object Relationship Attributes and Methods:** Associations, Super-sub relationship, A-part-of relationships – Aggregation, Case study: Relationship analysis, Class responsibility – Identifying attributes and methods, Class responsibility – Defining attributes by analysing Use cases and other UML diagrams, Object responsibility – Methods and messages. **The Object-Oriented Design Process and Design Axioms:** The Object-Oriented design process, Object-Oriented design axioms, Corollaries, Design patterns.	9
	Unit – V	
5	**Designing Classes:** The Object-Oriented design philosophy, UML object constraint language, Designing classes – The process, Class visibility – Designing well-defined public, Private and protected protocols, Designing classes – Refining attributes, Designing methods and protocols, Packages and managing classes. **Access Layer – Object Storage and Object Interoperability:** Object store and persistence – Database management systems, Logical and physical database organization and access control,	8

	Distributed databases and client-server computing, Distributed objects computing: the next generation of client-server computing, Object oriented database management systems – The pure world, Object-relational systems – The practical world, Multidatabases systems, Designing access layer classes, Case study – Designing the access layer.	
Unit – VI		
6	**View Layer – Designing (Interface Objects):** User interface design as a creative process, Designing view layer classes, Macro-level process – Identifying view classes by analysing use case, Macro-level process, The purpose of a view layer interface, Prototyping the user interface, Case study – Designing user interface, Software quality assurance, impact of Object-Oriented on testing.	6

Sr. No.	Object Oriented Software Design (Practicals)	Hours
1	Case study on object-oriented design system using UML diagrams.	4
2	Study various object-oriented methodologies, including Rumbaugh, Booch, and Jacobson's approaches and compare and contrast different methodologies, focusing on their strengths and weaknesses.	4
3	Identifying use cases in a real-world scenario, such as an ATM system for a bank and use the Unified Approach to develop a use case model and document the results effectively.	4
4	Learn classification theory and approaches for identifying classes in object-oriented analysis and apply techniques such as the noun phrase approach and use-case-driven approach to identify classes and their behaviors.	4
5	(a)Study different types of object relationships, including associations, super-sub relationships, and aggregation. (b)Analyze case studies to identify object responsibilities and define attributes and methods.	4
6	Study design patterns and their applications in developing well-structured object-oriented systems.	2
7	Case study on class design and visibility.	4
8	Case study on designing the access layer of a software system, including object storage and interoperability.	4

Text book:
1. Ali Bahrami, "Object Oriented Systems Development", Tata McGraw-Hill.

Reference books:
1. Mark Priestley, "Practical Object-Oriented Design with UML", 2nd Edition, Tata McGraw-Hill.
2. K Barclay, "Object-Oriented Design with UML and JAVA", Elsevier.

3. Grady Booch, Robert A. Maksimchuk, Michael W. Engle, Bobbi J. Young, Jim Conallen, and Kelli A. Houston, "Object-Oriented Analysis and Design with Applications", 3rd Edition, Addison-Wesley Professional.
4. Craig Larman, "Applying UML and Patterns: An Introduction to Object-Oriented Analysis and Design and Iterative Development", 3rd Edition, Addison Wesley.

Course objectives and Course outcomes mapping:
- To deliver understanding of object-oriented principal, methodology and analysis for software design and developments projects: CO1, CO2, CO3.
- To demonstrate object relationship analysis, interface design principals, enabling them to effectively design and develop object-oriented software systems: CO4, CO5, CO6.

Course units and Course outcomes mapping:

Unit No.	Unit Name	Course Outcomes					
		CO1	CO2	CO3	CO4	CO5	CO6
1	Introduction to Object-oriented Design	✓					
2	Object-Oriented Methodologies and Model Management		✓				
3	Identifying Use Cases and Object Analysis Classification			✓			
4	Identifying Object Relationship Attributes and Methods, and The Object-Oriented Design Process and Design Axioms.				✓		
5	Designing Classes, and Access Layer – Object Storage and Object Interoperability					✓	
6	View Layer – Designing (Interface Objects)						✓

Programme outcomes:

PO 1:   Engineering knowledge: An ability to apply knowledge of mathematics, science, and engineering.

PO 2:   Problem analysis: An ability to identify, formulates, and solves engineering problems.

PO 3:   Design/development of solutions: An ability to design a system, component, or process to meet desired needs within realistic constraints.

PO 4: Conduct investigations of complex problems: An ability to use the techniques, skills, and modern engineering tools necessary for solving engineering problems.

PO 5: Modern tool usage: The broad education and understanding of new engineering techniques necessary to solve engineering problems.

PO 6: The engineer and society: Achieve professional success with an understanding and appreciation of ethical behavior, social responsibility, and diversity, both as individuals and in team environments.

PO 7: Environment and sustainability: Articulate a comprehensive world view that integrates diverse approaches to sustainability.

PO 8: Ethics: Identify and demonstrate knowledge of ethical values in non-classroom activities, such as service learning, internships, and field work.

PO 9: Individual and team work: An ability to function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO 10: Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give/receive clear instructions.

PO 11: Project management and finance: An ability to demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO 12: Life-long learning: recognition of the need for, and an ability to engage in life-long learning.

Programme outcomes and Course outcomes mapping:

Programme Outcomes	Course Outcomes					
	CO1	CO2	CO3	CO4	CO5	CO6
PO1	✓					
PO2			✓			
PO3		✓		✓		✓
PO4		✓				
PO5					✓	
PO6						
PO7						
PO8						

PO9						
PO10						✓
PO11						
PO12						