FORM – 2.6

BIoE/CSE/CP/2022-23/REV: 01

BETHLAHEM INSTITUTE OF ENGINEERING
KARUNGAL

Department of Computer Science and Engineering

2.6 COURSE PLAN

Name of the Staff : **W.V.Vinisha**

Program : **B.E / CSE**

Course Code &Title : **CS8592 / Object Oriented Analysis and Design**

Year / Semester : **III / VI**

No. of Credits : **03**

1. Vision & Mission of the Program

VISION :-

To become a centre of excellence in Computer Science and Engineering with quality learning and in embracing future technologies with ethical values.

MISSION :-

- To impart quality education to computer science students irrespective of the socio-economical discriminations and enlighten their minds to achieve academic excellence.
- Adopt innovative strategies and add-on courses in Computer Science and Engineering in order to meet the national and global changes through student centric learning approach.
- To nurture the excellent and efficient staff and student community along with technical manpower.
- Establish the state-of-the-art computing system for effective teaching-learning process.
- Arrange the platform to share the views of the stakeholders to improve the overall personality development of the students.
- Motivate the social responsibilities of computer science engineers.

2. Program Educational Objectives (PEOs)

- To enhance the analysing, designing and competing knowledge of the graduates of our program by applying the basic engineering knowledge.
- The graduates of our program will have sound capabilities to possess and access innovative skills to adapt the rapid change in technologies.
- Our graduates are trained to be leaders to engage in socio-economic development of the society with ethical and legal values and captivate in lifelong learning.

3. Program Outcomes (POs)

Engineering Graduates will be able to:

1. Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

2.Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

3. Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

4. Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

5. Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

6. The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

7. Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

9. Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

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 and receive clear instructions.

11. Project management and finance: 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.

12. Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

4. Program Specific Outcomes (PSOs) :-

PSO 1: Analyse, design and develop quality product by applying standard software engineering concepts using open source programming environment.

PSO 2: Design and develop computer programs in various areas such as Networking, Artificial Intelligence, IoT, Data Science, Web design

PSO 3: Acquaint with emerging Information and Communication Technologies and provide innovative ideas and solutions to novel problems.

5. Course Outcomes (COs)

Students will be able to

CO1: Explain software design principles and design usecase diagram.

CO2: Design software applications using OO concepts.

CO3: Identify various scenarios based on software requirements and construct projects using UML.

CO4: Transform UML based software design into pattern based design using design patterns.

CO5: Learn the various testing methodologies for OO software.

6. Mapping of COs, POs& PSOs

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PS O2	PS O3
CO 1	3	1	-	-	2	3	-	-	-	-	-	-	3	1	2
CO 2	3	2	1	2	-	-	-	-	-	-	-	-	2	3	3
CO 3	3	3	3	3	-	-	-	-	3	-	2	-	2	2	3
CO 4	3	3	3	3	-	-	-	-	-	-	-	-	3	3	1
CO 5	3	3	2	-	3	-	-	-	-	-	-	3	3	1	1

High – 3, Medium – 2, Low - 1

JUSTIFICATION FOR CORRELATION

Sl. No	Related POs	Justification
CO1	PO1 PO2 PO5 PO6	1. Fundamental knowledge of Engineering to identify the real world entity. 2. Focuses on objects to analyze the complex requirements and mitigate them. 5.Able to develop the diagrams to solve problem easily 6.To apply the knowledge about object easily find the solutions.
CO2	PO1 PO2 PO3	1. Basics of Classes and objects to be identified. 2. Able to illustrate the UML diagram.

	PO4	3. Able to select the suitable object that meet the requirements of the class diagram. 4. Can analyze the classes and mitigate the risk during iteration.
CO3	PO1 PO2 PO3 PO4 PO9 PO11	1. Identify the objects and classes using basic oops concepts. 2. Able to analyze the various objects and classes and give a relationship to each object. 3. Suitable classes can be designed for the UML diagrams. 4. Able to design complex classes using communication diagram. 9. Various UML diagrams are categorize on modules and integrated by the developer. 11. UML diagrams are used to understand the concept and implemented easily.
CO4	PO1 PO2 PO3 PO4	1. Use the iterative loop concept to identify the risk free components. 2. Review the objects and requirements and mitigate the complex elements. 3. Design the appropriate pattern and ability to create to domain visibility. 4. Applying GOF patterns and analyzes the software patterns.
CO5	PO1 PO2 PO3 PO5 PO12	1. Basics of mathematical formula and flow chart used for various software testing process. 2. Can check the validity and verification using the requirements. 3. Can derive the various test case tool to testing the UML projects. 5. Practices to various testing techniques to produce the good quality project. 12. Able to study the performance of software testing techniques.

JUSTIFICATION FOR CORRELATION

CO	Related PSOs	Justification
CO1	PSO1 PSO2 PSO3	1.Analyse the process of defining the objects 2.Using the software programs design the UML diagrams 3. apply the knowledge about object easily find the solutions
CO2	PSO1 PSO2 PSO3	1.To develop the knowledge about business requirements 2. Able to select the suitable object that meet the requirements of the class diagram 3.Apply the UML diagrm to solve real time problems
CO3	PSO1 PSO2 PSO3	1.To identify the Implementations about design process 2. Able to perform analysis of use cases via the requirement of the project 3.Solve complex problems by using communication diagram
CO4	PSO1 PSO2 PSO3	1.Develop all the knowledge about risk free components 2.Analyse all the design patterns to develop domain reliability 3.To identify the requirements to solve risk factors
CO5	PSO1 PSO2 PSO3	1. Apply the software testing tools to test the modules. 2. check the validity and verification using the requirements. 3. Use the various testing tools manual or automated.

7. Pre-requisite

1. CS8392 - Object Oriented Programming (3rd semester)

Object Oriented Programming is Programming Methodology that organizes code into objects and relationships of objects. It focus on the object that developers want to manipulate.

8. Course Description

This course describes the analyzing and designing patterns using UML diagrams. It also give the concepts for creating the GOF patterns and various testing techniques using JAVA language.

9. Lesson Plan

Lecture No.	Topic(s) to be covered	Text / Ref. Book	Teaching Method (CTL, FL, EL, RL)	Testing Method (Group Discussion, MCQ, Tutorial, Seminar, Written / Oral Test)	Course Outcomes (COs)	No. of Hours	Cummulative Hours
Unit – I UNIFIED PROCESS AND USE CASE DIAGRAMS							
1	Introduction to OOAD with OO Basics	T1	ICT	MCQ,Written Test	CO1	1	1
2	Unified Process	T1,T2	FV		CO1	1	2
3	UML diagrams	T1	CTL		CO1	2	4
4	Case study-The Next Gen POS system	T1	CTL		CO1	1	5
5	Inception	T1	CTL		CO1	1	6
6	Use case modeling	T1	ICT		CO1	1	7
7	Relating Use cases	T1	CTL		CO1	1	8
8	Include, extend and generalization-when to use cases	T1	CTL		CO1	1	9

Lectue No.	Topic(s) to be covered	Text / Ref. Book	Teaching Method (CTL, FL, EL, RL)	Testing Method (Group Discussion, MCQ, Tutorial, Seminar, Oral/ Written Test)	Course Outcomes (COs)	No. of Hours	Cumulative Hours
Unit – II STATIC UML DIAGRAMS							
1	Class diagram	T2	CTL	MCQ,Writt en Test	CO2	1	10
2	Elaboration	T2	CTL		CO2	1	11
3	Domain Model	T2	CTL		CO2	1	12

4	Finding conceptual classes and description classes	T2	ICT		CO2	1	13
5	Associations - Attributes	T2	ICT		C02	1	14
6	Domain model Refinement	T2	CTL		CO2	1	15
7	Finding conceptual class hierarchies	T1	CTL		CO2	1	16
8	Aggregation and Composition	T1	FV		CO2	1	17
9	Relationship between Sequence diagrams and use cases- when to use class diagrams	T1	CTL		CO2	1	18

Lecture No.	Topic(s) to be covered	Text / Ref. Book	Teaching Method (CTL, FL, EL, RL)	Testing Method (Group Discussion, MCQ, Tutorial, Seminar, Written / Oral Test)	Course Outcome (COs)	No. of Hours	Cumulative Hours
Unit – III STATIC UML DIAGRAMS							
1	Dynamic diagrams- UML interaction diagrams	T1	CTL	MCQ,Written Test	CO3	1	19
2	System sequence diagrams	T1	ICT		CO3	1	20
3	Collaboration diagram	T1	CTL		CO3	1	21
4	When to use Communication diagrams	T1	CTL		CO3	1	22
5	State machine diagram and modeling- When to use State Diagrams	T1	ICT		CO3	1	23
6	Activity diagram – When to use activity diagrams	T1	CTL		CO3	1	24
7	Implementation Diagrams – UML package diagram	T1	CTL		CO3	1	25
8	When to use package diagrams	T1	CTL		CO3	1	26
9	Component and Deployment Diagrams- when to use Component and Deployment Diagrams	T1	CTL		CO3	1	27

Lecture No.	Topic(s) to be covered	Text / Ref. Book	Teaching Method (CTL, FL, EL, RL)	Testing Method (Group Discussion, MCQ, Tutorial, Seminar, Written / Oral Test)	Course Outcome (COs)	No. of Hours	Cumulative Hours

	Unit – IV DESIGN PATTERNS							
	1	GRASP : Designing objects with responsibilities	T1	ICT	MCQ,Written Test	CO4	1	28
	2	Creator	T1	CTL		CO4	1	29
	3	Information expert - Low coupling	T1	CTL		CO4	1	30
	4	High Cohesion - Controller	T1	CTL		CO4	1	31
	5	Design Patterns – creational-factory method	T1	CTL		CO4	2	33
	6	Structural – Bridge - Adaptor	T1	CTL		CO4	1	34
	7	Behavioral - Strategy - Observer	T1	CTL		CO4	1	35
	8	Applying GoF design Patterns- Mapping design to code	T1	ICT		CO4	1	36

Lecture No.	Topic(s) to be covered	Text / Ref. Book	Teaching Method (CTL, FL, EL, RL)	Testing Method (Group Discussion, MCQ, Tutorial, Seminar, Written / Oral Test)	Course Outcome (COs)	No. of Hours	Cumulative Hours
	Unit – V TESTING						
1	Object oriented Methodologies	T1	ICT	Seminar	CO5	2	38
2	Software Quality Assurance	T1	CTL		CO5	3	41
3	Impact of object orientation on Testing	T1	CTL		CO5	2	43
4	Develop test cases and test plans	T1	ICT		CO5	2	45

[CTL-Chalk and Talk, FL- Flipped Class, EL- Experiential Learning, RL- Research based Learning]

10. **List of Text Books by AU:**

T1. Craig Larman, " Applying UML and Patterns: An introduction to Object Oriented Aanalysis and Design and Iterative Development", Third Edition, Pearson education, 2005.

T2. Ali Bahrami – Object Oriented Systems Development- McGraw Hill International Edition.- 1999.

11. **Reference Books by AU:**

R1. Erich Gamma, and Richard Helm, Ralph Johnson, John Vissides, " Design patterns: Elements of Reusable Object- oriented Software".Addison- Wesley, 1995.

R2. Martin Fowler, 'UML Distilled: A Brief Guide to the standard Object Modeling Language", Third edition, Addison Wesley,2003.

12. Other Related books Available in our library:

O1. Object Oriented Modelling and Design with UML-J.Rambaugh, Pearson

O2. UML 2 and the unified process: Practical Object Oriented Analyais & Design – JimArlow, 2001.

13. Web Resources

Unit	Topic	Web Link
I	Use Case Diagram	https://www.geeksforgeeks.org/designing-use-cases
II	Aggregation and composition	https://www.javatpoint.com/uml-association-vs-aggregation-vs-composition
III	UML Package Diagram	https://www.uml-diagrams.org/package-diagrams.html
IV	Low coupling and High Cohesion	https://enterprisecraftsmanship.com/posts/cohesion-coupling-difference
V	Develop test cases and test plans	https://www.softwaretestinghelp.com/difference-between-test-plan-test-strategy-test-case-test-script-test-scenario-and-test-condition/

14. Video Resources

Sl. No	University	Website	Video Link
V1	IIT Madras	www.nptelvideos.com	Object Oriented System Development Using UML, Java And Patterns https://onlinecourses.nptel.ac.in/noc22_cs55/preview
V2	IIT Madras	www.nptelvideos.com	GOF Patterns https://nptel.ac.in/courses/106/105/106105224/

15. Assignments

Sl.No.	COs	Topic
1	CO1	Explain the benefits and concepts of use case and use case model and analyze the relating use cases for ATM system
		Case Study-NextGenPOS system
2	CO2	Design the Class diagram for Hospital management system? Find and draw conceptual classes for the same
		Domain model develpoment
3	CO3	Develop and draw the following UML diagrams for Airline Ticket reservation system. (i) Sequence diagram (booking a ticket) **(ii)** Activity diagram. **(iii)** State chart diagram.
		Differentiate sequence diagram and collaboration diagram
4	CO4	Explain about Fabrication
		Explain about adapter
5	CO5	Develop the test cases for the Net bank ATM System
		Explain different lifecycle models in software engineering

16. Content beyond Syllabus

Details of Content Beyond the syllabus for attaining COs/POs/PSOs:

Sl. No	Gap Identified	Contents/Activity to bridge the gap	Method of Implementation (Seminar / Guest Lecture/IV/Workshop etc.)	No. of Period	Mapping to COs	Mapping to POs	Mapping to PSOs

1	OOSE	Object oriented design concepts	Seminar	1	CO1 CO2	PO2,PO3,PO4	1
2	OO testing	Seven principles will be explained	Seminar	1	CO5	PO3,PO4	3

JUSTIFICATION FOR CORRELATION

Contents/Activity to bridge the gap	**Related COs, POs & PSOs**	**Justification**
1.	CO1	Students will be able to develop object oriented Software design
	PO2	Students will be able to identify and analyse complex engineering problems.
	PO3	Students will be able to design solutions for new complex problems
	PO4	Students will be able to develop solutions for research problems.
	PSO1	Students will be able to model complex engineering problems.
2	CO5	Students will be able to apply the basic principles in testing
	PO3	Students will be able to test and provide solutions for all complex problems
	PO4	Students will be able to test new research problems.
	PSO1	Students will be able to test the complex problems manually.

17. Journals Link

Sl. No	**Journal Name**	**Publisher**	**Link**
1.	International Journal of Computer Aided design	Elsevier	https://www.journals.elsevier.com/computer-aided-design
2.	Journal of UML for OOA and OOD	koreascience	https://www.koreascience.or.kr/article/JAKO201722647668805.page

18 . Assessment Methodology

Assessment	Topic	CO	Marks
IAT-1	Unit 1& Unit 2	CO1 CO2	49 51
IAT-2	Unit 3 & Unit 4	CO3 CO4	49 51
Model Test	Unit 1- Unit 5	CO1 CO2 CO3 CO4 CO5	17 17 17 17 32
Assignment	Unit 1- Unit 5	CO1 CO2 CO3 CO4 CO5	20 20 20 20 20
Slip Test	Unit 5	CO5	40

Course In-charge **Verified by** (ACADEMIC RESOURCE CELL MEMBER) **HoD** **Principal**