INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

Dundigal, Hyderabad - 500 043

INFORMATION TECHNOLOGY

COURSE DESCRIPTION FORM

Course Title	**OBJECT ORIENTED ANALYSIS AND DESIGN**			
Course Code	**A60524**			
Regulation	**R15 - JNTUH**			
Course Structure	Lectures	Tutorials	Practical's	Credit
	4	-	-	4
Course Coordinator	Mr. E. Sunil Reddy, Assistant Professor, IT			
Team of Instructors	Mr. E. Sunil Reddy, Assistant Professor, IT			

I. COURSEOVERVIEW:

The Unified Modeling Language is a graphical language for visualizing, specifying, constructing and documenting the artifacts of a software intensive system. The UML gives you a standard way to write systems blueprints covering conceptual things such as business processes and system functions as well as concrete things such as classes written in a specific programming language database schemas and reusable software components. Learn what the UML is what it is not and why the UML is relevant to the process of developing software intensive systems.

II. PREREQUISITE(S):

Level	Credits	Periods/ Week	Prerequisites
UG	4	6	Object Oriented Programming, Software Engineering

III. MARKSDISTRIBUTION:

Sessional Marks	University End Exam Marks	Total Marks
Midterm Test There shall be two midterm examinations. Each midterm examination consists of essay paper, objective paper and assignment. The essay paper is for 10 marks of 60 minutes duration and shall contain 4 questions. The student has to answer 2 questions, each carrying 5 marks. The objective paper is for 10 marks of 20 minutes duration. It consists of 10 multiple choice and 10 fill-in-the blank questions, the student has to answer all the questions and each carries half mark. First midterm examination shall be conducted for the first two and half units of syllabus and second midterm examination shall be conducted for the remaining portion. Five marks are earmarked for assignments. There shall be two assignments in every theory course. Assignments are usually issued at the time of commencement of the semester. These are of problem solving in nature with critical thinking. Marks shall be awarded considering the average of two midterm tests in each course.	75	100

IV. EVALUATIONSCHEME:

S. No	Component	Duration	Marks
1.	I Mid Examination	80 minutes	20
2.	I Assignment	-	5
3.	II Mid Examination	80 minutes	20
4.	II Assignment	-	5
5.	External Examination	3 hours	75

V. COURSE OBJECTIVES:

At the end of the course, the students will be able to:

I. Understand the basic principles of object-oriented techniques**.**
II. Acquire the knowledge and usage of object- oriented analysis and design concepts.
III. Explore and analyze different analysis and design models, such Object Oriented Models, Structured Analysis and Design Models.
IV. Analyze and understand how to map one style of diagrammatic notations into another.
V. Understand the studying and developing examples of existing UML models.

VI. COURSE OUTCOMES:

After completing this course the student must demonstrate the knowledge and ability to:

1. Explain the importance of modeling.
2. Demonstrate the Conceptual model of UML and SDLC.
3. Illustrate classes and relationships.
4. Define classes modeling techniques and instances modeling techniques.
5. Describe interaction diagrams and their modeling techniques.
6. Explain events and signals and their modeling techniques.
7. Explain the terms and concepts of component and deployment.
8. Demonstrate component and deployment diagram and their modeling techniques.
9. Analyzing and modeling library application and static and dynamic models of library application.
10. Demonstrate state machines and state chart diagrams and their modeling techniques.

VII. HOW PROGRAM OUTCOMES AREASSESSED:

Program Outcomes		Level	Proficiency assessed by
PO1	**Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.	H	Assignment Tutorials
PO2	**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.	H	Assignments
PO3	**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.	H	Mini Projects
PO4	**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.	S	Projects
PO5	**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.	H	Projects

PO6	**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.	N	--
PO7	**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.	N	--
PO8	**Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.	N	--
PO9	**Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.	S	Tutorials
PO10	**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.	H	Mini Projects
PO11	**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.	N	--
PO12	**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.	S	Lecture, Projects

N- None **S-Supportive** **H - Highly Related**

VIII. HOW PROGRAM SPECIFIC OUTCOMES AREASSESSED:

Program Specific Outcomes		Level	Proficiency assessed by
PSO1	Professional Skills: The ability to research, understand and implement computer programs in the areas related to algorithms, system software, multimedia, web design, big data analytics, and networking for efficient analysis and design of computer-based systems of varying complexity.	H	Lectures, Assignments
PSO2	Software Engineering Practices: The ability to apply standard practices and strategies in software service management using open-ended programming environments with agility to deliver a quality service for business success.	S	Projects
PSO3	Successful Career and Entrepreneurship: The ability to employ modern computer languages, environments, and platforms in creating innovative career paths, to be an entrepreneur, and a zest for higher studies.	H	Guest Lectures

N - None **S - Supportive** **H - Highly Related**

IX. SYLLABUS:

UNIT - I

Introduction to UML: Importance of modeling, principles of modeling, object oriented modeling, Conceptual model of the UML, Architecture, and Software Development Life Cycle.

UNIT – II

Basic Structural Modeling: Classes, Relationships, common Mechanisms and diagrams.

Advanced Structural Modeling: Advanced classes, advanced relationships, Interfaces, Types and Roles, Packages.

Class & Object Diagrams: Terms, concepts, modeling techniques for Class & Object Diagrams

UNIT – III

Basic Behavioral Modeling-I: Interactions, Interaction diagrams.

Basic Behavioral Modeling –II: Use cases, Use case Diagrams, Activity diagrams.

UNIT – IV

Advanced Behavioral Modeling: Events and Signals, State machines, Processes and Threads, Time and space chart diagrams.

Architectural Modeling: Component, Deployment, Component Diagrams, Deployment diagrams

UNIT – V

Pattern and Frameworks, Artifact Diagrams Case Study: The Unified Library application

Text books:

1. Grady Booch, James Rum baugh, Ivar Jacobson: The Unified Modeling Language User Guide, Pearson Education.
2. Hans, Erik Eriksson Magnus Penker, Brian Lyons, David Fado: UML 2 Toolkit, WILEY, Dreamtech India Pvt. Ltd.

References:

1. Meilir Page Jones: Fundamentals of Object Oriented Design in UML, Pearson Education.
2. Pascal Roques: Modeling Software Systems Using UML2, WILEY, Dreamtech India Pvt. Ltd.
3. Atul Kahate: Object Oriented Analysis & Design, The McGraw Hill Companies.
4. Craig Larman Appling UML and Patterns: An introduction to Object Oriented Analysis and Design and Unified Process, Pearson Education.
5. Mark Priestley: Practical Object-oriented Design with UML, TATA McGraw Hill.

IX. COURSEPLAN:

At the end of the course, the students are able to achieve the following course learning outcomes:

Lecture No.	Course Learning Outcomes	Topics to be covered	Reference
1 - 2	Explain the importance of modeling.	Importance of Modeling ,Principles of Modeling ,Object Oriented Modeling	T1:26-32
3 - 4	Demonstrate the Conceptual model of UML and SDLC.	Conceptual model of UML. Architecture, Software Development Life Cycle	T1:39-57
5 - 6	Illustrate classes and relationships mechanisms and diagrams.	Classes, Modeling the vocabulary, Modeling the distribution of responsibilities, Modeling non software things, Modeling primitive types of a System.	T1:69-95
7 - 8	Illustrate relationships mechanisms and diagrams	Relationships: Terms and Concepts. Modeling single dependencies, Modeling single inheritance, Modeling structural relationships, Creating webs of relationships	T1:97-155
9 - 10	Demonstrate common mechanisms and diagrams	Common mechanisms and diagrams: Notes, Stereotypes, Tagged values and constraints. Modeling comments, new building blocks, new properties, Semantics, Extending UML.	T1:157-201
11 - 13	Explain complex views of system	Diagrams, view and models, modeling different views of a system, modeling different level of abstraction, modeling complex views	T1:127-213
14	Define Advanced structural modeling techniques	Advanced structural modeling, Advanced. classes Classifiers, Modeling semantics of a class, choosing right kind of a classifier	T1:214-223
15	Explain advanced relationships	Advanced Relationships: advanced dependency, generalization, association Realization. Refinement relationships, Modeling webs, Creating webs of relationship	T1:229-239
16	Illustrate Interfaces and their modeling techniques	Interfaces, Types, Roles, Realization Modeling the seams in a seam. Static and dynamic types, Making interfaces understandable and approachable. Packages, visibility, importing and exporting, modeling group of elements, architectural views, Scaling up to large systems	T1:267-278
17 - 19	List interaction Modeling techniques	Common modeling techniques: Modeling simple collaboration, logical database schema, Forward and Reverse Engineering	T1:244-261
20 - 21	Describe instances and their modeling techniques	Instances: Terms and Concepts, Common modeling Techniques, Modeling concrete Instances.	T1:281-311
22	State Prototypical modeling techniques.	Modeling Prototypical Instances. Object Diagrams: Modeling Object structures, Forward and Reverse Engineering	T1:281-311

23 - 24	Demonstrate interaction diagram	Interactions: Terms and Concepts. Common Modeling Techniques, Modeling Flow of control.	T1:312-360
25 - 26	Illustrate Interfaces and their modeling techniques	Interaction Diagrams: Terms and Concepts. Common Modeling Techniques: Modeling Flow of control by time ordering, Modeling Flow of control by Organization. Forward and Reverse Engineering	T1:355-378
27	Demonstrate use case diagrams	Use case: Terms and Concepts. Common Modeling Techniques: Modeling the behavior of an element.	T1:382-433
28 - 29	Describe Use cases and their modeling techniques	Use case diagrams: Common Modeling Techniques: Modeling the Context of a system, Modeling the requirements of a system, Forward and Reverse Engineering.	T1:434-438
30 - 32	State Activity diagrams and their modeling techniques	Activity Diagrams: Terms and Concepts. Common modeling techniques: Modeling a Workflow, Modeling an Operation Forward and Reverse engineering.	T1:279-295
33	Describe Events And Signals	Events and Signals: Terms and Concepts. Common modeling Techniques: Modeling a Family of signals, Modeling exceptions.	T1:299-306
34	Illustrate State machines and their modeling techniques	State Machines: Terms and Concepts, Common modeling Techniques, Modeling the lifetime of an object.	T1:312-328
35 - 36	List Process and threads modeling techniques	Processes and Threads: Terms and concepts, Modeling multiple Flows of Control, modeling inter process communication	T1:333-342
37 - 38	Describe Component and deployment and their modeling techniques	Components: Terms and Concepts. Modeling Executable and Libraries, modeling tables, Files and Documents modeling an API, modeling Source co	T1:367-377
39 - 40	Demonstrate Deployment Diagram	Deployment: Terms and Concepts, Modeling Processors and Devices, Modeling the	T1:382-389
41 - 42	Demonstrate Component and deployment diagram	Component Diagram :Terms and Concepts, Modeling Source code ,an executable Release, Physical database, Adaptable systems, Forward and Reverse engineering	T1:416-425
43 - 44	Demonstrate Deployment Diagram and client server system	Deployment Diagram: Terms and Concepts, Modeling an Embedded system. Modeling Client Server System, a Fully distributed system, Forward and Reverse engineering	T1:429-438
45-50	Illustrate Patterns and Framework	Patterns and Framework, Artifact Diagrams The unified library Application	T1: 403-411
51-57	List Artifacts diagrams and library diagram	Artifact Diagrams The unified library Application	T1: 476-477

X. MAPPING COURSE OBJECTIVES LEADING TO THE ACHIEVEMENTOF PROGRAM OUTCOMES AND PROGRAM SPECIFICOUTCOMES:

Course Objectives	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
I		S	H										H	S	H
II		H			S								S		H
III										H	S		H	S	S
IV			S		H								H	S	S
V											S	H	S		H

S – Supportive **H – Highly Related**

XI. MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcomes	Program Outcomes												Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	H					S							H		H
2		S									H		S	H	
3		H	S											H	H
4			H		S								S	H	
5					H						S		H		S
6					S			H					H	H	S
7		H									S		H		S
8			H	S									H	S	
9			H	S									H		H
10					H							S	H	S	H

S – Supportive **H – Highly Related**

Prepared by **:** Mr. E. Sunil Reddy, Assistant Professor, IT

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