

CSPE3006 OBJECT ORIENTED ANALYSIS AND DESIGN (3-0-0)

Course Objectives:

- To give students a detailed understanding of processes and techniques for building large object-oriented software systems.
- To give clear idea on implementing design with UML diagram like state diagram, activity diagram, use-case diagram etc.
- To grasp the fundamental principles of object-oriented analysis, design, development, and programming.
- To apply design principles such as GRASP and SOLID to create robust and flexible designs.
- To apply appropriate development processes to ensure systematic and efficient system development

Module-I: (07 Hrs)

Fundamentals of Object-Oriented Concepts and Software Development

Introduction to Object-Oriented Paradigm, Overview of Object-Oriented Programming (OOP): Encapsulation, Abstraction, Inheritance, Polymorphism, Object-Oriented vs Procedural Programming, Object-Oriented Software Development Life Cycle (SDLC), Introduction to UML (Unified Modeling Language), Modeling design Technique, Types of models.

Module-II: (09 Hrs)

Class and state modeling

Class Modeling: Object & Class, Links & Associations, Generalization & Inheritance, Association Ends - scope, visibility, Multiplicity, Role names, Ordering, bags & sequences, Qualified association, Aggregation, association attributes & association classes, propagation of operations, Abstract class, Metadata, elements of class diagrams, constructing class diagrams.

State Modeling: Events, States, Transitions & Conditions, Activity Effects, Do-Activities, Entry & Exit Activities, Completion Transitions, Elements of State diagrams, Nested state diagrams, signal generalization, concurrency, constructing state diagrams. Requirements and Use Case Modeling

Module-III: (08 Hrs)

Use Case modeling: Actors, Use Cases, relationships - between actors, between use cases and between actor and use case, elements of use case diagram, constructing use case diagrams.

Interaction Modeling: Elements of sequence diagram and communication diagram, constructing sequence diagram and communication diagram

Activity Modeling: Elements of activity diagram, constructing activity diagram

Module-IV: (08 Hrs)

Dynamic Modeling and Behavioral Design

Sequence Diagrams-notations, creation, use cases, Elements of sequence diagram and communication diagram, constructing sequence diagram and communication diagram

Activity Modeling: Elements of activity diagram, constructing activity diagram, State Machine Diagrams, Modeling Object Interactions, Design Principles (GRASP, SOLID)

Module-V: (08 Hrs)

System Analysis & design: System development stages, system conception, analysis, domain class model, domain state model, iterating the analysis.

Application interaction model, application class model, application state model, adding operations System Design: estimating performance, make are use plan, organize the system into subsystem, identifying concurrency, allocating subsystems to processors and tasks.

Course Outcomes:

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

- Demonstrate and represent UML model elements to enable visual representation of the system being developed.
- Identify and build an appropriate process model for a given project.
- Analyze the principles at various phases of software development.
- Understand the software project estimation models and estimate the work to be done, resources required and the schedule for a software project.
- Analyze and differentiate the static and dynamic behavior of the system to achieve the intended functionalities.

Text Books:

1. Michael Blaha, James Rumbaugh: Object Oriented Modelling and Design with UML, 2nd Edition, Pearson Education, 2005
2. Grady Booch et. al.: Object-Oriented Analysis and Design with Applications, 3rd Edition, Pearson Education, 2007.

Reference Books:

1. Booch, Jacobson, Rumbaugh: Object-Oriented Analysis and Design with Applications, 3rd edition, Pearson, Reprint 2013
2. Satzinger, Jackson and Burd: Object-Oriented Analysis & Design with the Unified Process, Cengage Learning, 2005.