

## UML & Design Patterns

### Course Objectives:

The focus of this course is on design rather than implementation.

1. Introducing the Unified Process and showing how UML can be used within the process.
2. Presenting a comparison of the major UML tools for industrial-strength development.
3. introduction to design patterns, practical experience with a selection of central patterns.

### Course Outcomes:

Students successfully completing this course will be able to:

1. identify the purpose and methods of use of common object-oriented design patterns
2. select and apply these patterns in their own designs for simple programs
3. represent the data dependencies of a simple program using UML
4. represent user and programmatic interactions using UML
5. create design documentation outlining the testable and complete design of a simple program
6. produce and present documents for the purpose of capturing software requirements and specification
7. produce plans to limit risks specific to software designed for use in a particular social context

### Syllabus:

**Unit I: Introduction :** Introduction to OOAD; typical activities / workflows / disciplines in OOAD, Introduction to iterative development and the Unified Process, Introduction to UML; mapping disciplines to UML artifacts, Introduction to Design Patterns - goals of a good design, Introducing a case study & MVC architecture

**Unit II: Inception:** Artifacts in inception, Understanding requirements - the FURPS model, Understanding Use case model - introduction, use case types and formats, Writing use cases - goals and scope of a use case, elements / sections of a use case, Use case diagrams, Use cases in the UP context and UP artifacts, Identifying additional requirements, Writing requirements for the case study in the use case model

**Unit III: Elaboration:** System sequence diagrams for use case model, Domain model : identifying concepts, adding associations, adding attributes, Interaction Diagrams, Introduction to GRASP design Patterns ,Design Model: Use case realizations with GRASP patterns, Design Class diagrams in each MVC layer  
Mapping Design to Code, Design class diagrams for case study and skeleton code

**Unit 4: More Design Patterns:** Fabrication, Indirection, Singleton, Factory, Facade, Publish-Subscribe

**Unit 5: More UML diagrams :** State-Chart diagrams, Activity diagrams, Component Diagrams, Deployment diagrams, Object diagrams

**Unit 6: Advanced concepts in OOAD :** Use case relationships, Generalizations  
Domain Model refinements, Architecture, Packaging model elements

### Textbooks:

1. 'Applying UML and patterns' by Craig Larman, Pearson
2. Object-Oriented Analysis & Design with the Unified Process by Satzinger, Jackson & Burd Cengage Learning
3. 'UML distilled' by Martin Fowler , Addison Wesley, 2003

### Reference:

1. O'reilly 's 'Head-First Design Patterns' by Eric Freeman et al, Oreilly
2. UML 2 Toolkit, by Hans-Erik Eriksson, Magnus Penker, Brian Lyons, David Fado: WILEY'-Dreamtech India Pvt. Lid.