Object-Oriented Analysis and Design with UML and Java Course Outline

1. Overview of OOAD

- Object-Oriented concepts
- Object
- Object relationships
- Encapsulation
- Class
- Inheritance
- Polymorphism
- The Unified Object-Oriented Software Development Process
- Unified Modeling Language and Rational Rose

2. Requirements Workflow

- Requirements Workflow
- Requirements
- Problem Analysis and User Needs
- Requirements Workshop
- UML and Requirements Capture

3. Use Case Analysis

- Use Case Analysis
- Use Cases and Actors.
- Use Cases Relationships.
- Use Case Diagram.
- Case study.

4. Analysis Workflow

- The Analysis Workflow
- Analysis In the Rational Unified Process
- Class Analysis
- Use Case Realizations
- Analysis Packages
- Post Analysis

5. Class Identification

- Class identification
- Class categories: entity, boundary, control
- Noun/verb analysis
- CRC cards
- Class diagrams
- Object diagrams

6. Class Relationship Analysis

- Class relationship analysis
- Class association
- Aggregation
- Composition
- Qualification
- Association Classes

7. Object State Analysis

- Object State Analysis
- Object State
- State Machine Diagrams
- Transitions
- Events
- Signals
- Time/Change Events
- Substates/Superstates
- Concurrent States

8. Object Activity Analysis

- Object Activity Analysis
- Object Activities
- Activity Diagrams
- Nodes
- Edges, Flows
- Branches, Merges
- Tokens
- Signals
- Parallel Activity
- Partitions
- Pins and Transformations
- Sequence Diagrams
- Message Notation
- Creation, condition, iteration, destruction
- Loops and Conditions
- Communication Diagrams

9. Design Workflow

- Design Workflow
- Design in RUP
- Design vs. Analysis
- Design Workflow
- Refining Classes and Relationships
- Refining Use Cases

10. Object Design

- Object Design
- Generalization
- Encapsulation
- Interface, types and roles
- Persistent objects
- Active Objects
- Template (parameterized) classes

11. System Design

- System Design
- Collaborations
- Packages
- Systems and subsystems
- Component diagram
- Deployment diagram
- Modeling different views of a system

12. Other UML Diagrams

- Other UML Diagrams
- Composite Structure Diagram
- Timing Diagrams
- Interaction Overview Diagram

13. Software Development Process

- Risk Management
- Requirements Change
- Configuration Management
- Quality Assurance
- Agile Modeling

14. RUP

- Software Development Methodologies
- Waterfall v.s. Iterative
- Low Ceremony v.s. High Ceremony
- The Spirit of the Rational Unified Process
- The Life Cycle of Projects Using the Rational Unified Process

15. Refactoring

- Refactoring Principles
- Common anti-patterns that should trigger the refactoring process
- Some common refactorings

16. Reuse

- Introduction to Software Reuse
- What is Software Reuse
- Why Reuse Software
- How Software Assets Become Reusable
- Basic Techniques for Software Reuse
- Software Reuse in the Lifecycle of Software Development
- Software Reuse management
- Domain Engineering - Develop Software for Reuse

17. Design Patterns

- Patterns
- Common Design Patterns
- Factory Method
- Singleton
- Command
- Facade
- Adapter
- Proxy
- Publish-Subscribe
- Common Architecture Patterns
- Three-tier Architecture
- Multi-tier Architecture
- Model-View-Controller

18. Java Binding

- Introduction to basic Java
- Java fundamentals
    - Data types
    - Syntax
- Application of OOP in Java
    - Access specifier
    - Access modifier
    - Abstraction
    - Encapsulation
    - Inheritance
    - Polymorphism
- Encapsulation: creation of classes and methods in Java
- Who, where and what concepts
- Object relationships
- Using objects in Java through relationships
- Composition relationship in Java
- Java's inheritance mechanism implementing inheritance in Java writing and using Interfaces
- Design patterns in Java