Software Design & Architecture | Object-Oriented Design

Course 1: Object-Oriented Design
This course takes Java beginners to the next level by covering object-oriented analysis and design. Learners will discover how to create modular, flexible, and reusable software, by applying object-oriented design principles. They will communicate these designs by expressing them in a visual notation known as Unified Modelling Language (UML). Learners will be challenged in the capstone project to apply their knowledge of object-oriented design by evolving and documenting a Java codebase with corresponding UML documentation.

Upon successful completion of this course, you will be able to:
• Apply the CRC (Class Responsibility Collaborator) technique to analyze and design the object-oriented model for a problem.
• Construct an object-oriented model to represent the information structure of a real world problem.
• Apply design guidelines for modularity, separation of concerns, information hiding, and reusability to create a flexible, reusable, maintainable design.

Quizzes			**50%**
Module Review Quizzes	(3)	x 10%	30%
Course Review Quiz	(1)	x 20%	20%
Capstone Assignments			**50%**
1.1 UML Diagram	(1)	x 12.5%	12.5%
1.2 UML Sequence Diagram	(1)	x 12.5%	12.5%
1.3 UML State Diagram	(1)	x 12.5%	12.5%
1.4 Update UML Class Diagram	(1)	x 12.5%	12.5%

Module 1 — Object-Oriented Analysis & Design

1.1.1 – Welcome to Software Design Architecture — 8 min.

1.1.2 – Software Architect and Design Roles in Industry — 2 min.

Assessment: **Java Pre-test – Ungraded** (12 questions)
Passing threshold - 70% — *Course weight 0%*

Course Resources: **Object-Oriented Design: Course Notes & Glossary**

1.1.3 – Object-Oriented Modeling
- Defining objects — 3 min.

Discussions: **Introduce Yourself**

Reading – **Eliciting Requirements: User Stories**

Reading – **Technical Design: Object Types**

1.1.4 – Client Requirements, Conceptual & Technical Designs — 9 min.

1.1.5 – Competing Qualities and Trade-offs — 6 min.

1.1.6 – CRC: Record, Organize and Refine Components — 7 min.

Discussions: **Modeling CRC**

Module Assessment: **Quiz 1 – Graded** (12 questions)
Passing threshold - 75% — *Course weight 10%*

Module 2 — Object-Oriented Modeling

1.2.1 – Creating Models in Design: Bridging Concepts & Solutions — 4 min.

1.2.2 – Languages Evolution — 6 min.

Discussions: **Design Principles & Language Evolution**

1.2.3 – Four Design Principles: Abstraction — 5 min.

1.2.4 – Four Design Principles: Encapsulation — 6 min.

1.2.5 – Four Design Principles: Decomposition — 5 min.

1.2.6 – Four Design Principles: Generalization — 5 min.

1.2.7 – Abstraction in Java & UML — 6 min.

1.2.8 – Encapsulation in Java & UML — 4 min.

1.2.9 – Decomposition in Java & UML — 8 min.

1.2.10 – Generalization with Inheritance in Java & UML — 7 min.

1.2.11 – Generalization with Interfaces in Java & UML — 8 min.

Peer Review: **Create a UML Diagram – Practice**
Passing threshold - 70% — *Course weight 0%*

Peer Review: **Capstone Assignment 1.1 – UML Diagram**
Passing threshold - 70% — *Course weight 12.5%*

Module Assessment: **Quiz 2 – Graded** (12 questions)
Passing threshold - 75% — *Course weight 10%*

Module 3 — Design Principles

1.3.1 – Coupling and Cohesion — 6 min.

Discussions: **Coupling and Cohesion**

1.3.2 – Separation of Concerns — 9 min.

1.3.3 – Information Hiding — 6 min.

1.3.4 – Conceptual Integrity — 5 min.

Discussions: **Design Principles**

1.3.5 – Generalization Principles: Inheritance Issues — 5 min.

1.3.6 – Modeling Behaviour: UML Sequence Diagram — 7 min.

Peer Review: **Create a UML Sequence Diagram – Practice**
Passing threshold - 70% — *Course weight 0%*

Peer Review: **Capstone Assignment 1.2 – UML Sequence Diagram**
Passing threshold - 70% — *Course weight 12.5%*

1.3.7 – Modeling Behaviour: UML State Diagram — 7 min.

Peer Review: **Create a UML State Diagram – Practice**
Passing threshold - 70% — *Course weight 0%*

Peer Review: **Capstone Assignment 1.3 – UML State Diagram**
Passing threshold - 70% — *Course weight 12.5%*

1.3.8 – Model Checking — 4 min.

Module Assessment: **Quiz 3 – Graded** (12 questions)
Passing threshold - 75% — *Course weight 10%*

Module 4 — Capstone Challenge: Update an App's Code

Peer Review: **Capstone Assignment 1.4 – Update the App**
Passing threshold - 70% — *Course weight 12.5%*

Course Assessment: **Final Exam – Graded** (30 questions)
Passing threshold - 75% — *Course weight 20%*

Discussions: **Last Word – Object-Oriented Design**

NOTE: The lesson number refers to the course, module, and lesson. For example, lesson 1.2.3 refers to the first course, second module, third lesson.

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