

1 Course 1: Advanced Object Oriented Programming (AOOP)

1.1 Mode of Study: AOOP - Advanced (A)

COURSE CODE 21CS2116AA

L-T-P-S 3-0-4-4

CREDITS 6

PREREQUISITE CTOOD

1.1.1 Course Outcome

CO#	Course Outcome (CO)	PO/PSO	BTL
CO1	Apply Design Patterns & Test-Driven Development with Clean coding Techniques	PO-1, PSO-1	3
CO2	Understand the Collections & Generics over Object-oriented Programming.	PO-2, PO-5	4
CO3	Apply the various Concurrent Programming methodologies in Object Oriented Programming	PO-2, PO-5	4
CO4	Develop the applications using JDBC with PostgreSQL, Servlet & JSP	PO-2, PO-5, PSO-2	4
CO5	Analyze the various design techniques to solve any real-world problems.	PO-2, PO-5, PSO-2	4

1.1.2 Syllabus

Design Patterns: Introduction to design patterns, Structural, Creational Behavioural patterns. Decorator, Bridge, adapter and facade patterns, Singleton, factory method, abstract factory patterns, observer, command, state, iterator, chain of responsibility patterns, dependency injection. Clean Coding Techniques: Introduction to codesmells - bloaters, Object-oriented abusers, change preventers, dispensables and couplers. Refactoring techniques to remove the code smells. Test Driven Development (TDD): Introduction to TDD, Introduction to Unit Testing JUnit.

Generics Collections Framework: Introduction to generics, usage of generics with interfaces, building stacks, queues, and Priority Queues, applying the comparator, comparable, cloneable iterator interfaces, Introduction to Sets and Maps and their Java API. Building BST, AVL trees and graphs-based algorithms. Graph visualization, traversal, DFS and BFS. Case studies related to trees and graphs.

Multi-threading Parallel programming: Introduction to Multithreading and Parallel Programming, Thread Concepts its States, Creating Tasks Threads, Thread Classes, Thread Pools, Thread Synchronization Locks, Cooperation among Threads, Case Study: Producer/Consumer, Blocking Queues, Semaphores, Deadlock Avoidance, Synchronized Collections Parallel Programming.

JDBC: API, Components, Architecture (2 Tier 3 Tier), Drivers Its Types, Packages for JDBC Connection, Steps to connect to Databases (PostgreSQL). Servlets: Overview, Life Cycle of Servlet, Attributes in Servlets, Interaction between Client Servlet, Servlet demo Application development with Sessions, JSP: JSP Advantages over servlets, Features, syntax, Life Cycle of JSP, Environmental Setup for JSP, Interaction between client, JSP server. JSP demo Application Development

1.1.3 Text Books

- Eric Freeman, Elisabeth Robson, Bert Bates, Kathy Sierra, Head First Design Patterns, O'Reilly Media, Inc., October 2004.
- Y Daniel Liang, Introduction to Java Programming, Pearson, 10th Edition, 2011.
- Siahaan, V., Sianipar, R.H., Step by Step Database Programming, 2019, SPARTA Publishing.
- Kathy Sierra, Bryan Basham, Bert Bates, Head First Servlets and JSP, O'Reilly Media, Inc., 2nd Edition, 2008

1.1.4 Reference Books

- Gamma, E., Helm, R., Johnson, R., Johnson, R. E., Vlissides, J. (1995). Design patterns: elements of reusable object-oriented software. Pearson Deutschland GmbH
- Kent beck, (2002). Test-Driven Development – by Example. Pearson publication.
- Naftalin, Maurice, and Philip Wadler. (2005). Generics and Collections in Java. O'reilly Media Inc.
- Brian Goetz. (2006). Java Concurrency in Practice. Bible Inc.
- Santosh Kumar K. , Kogent Solutions Inc., Santosh Kumar K. And Kogent Solutions Inc. (2008). JDBC, Servlets, And JSP Black Book. Dreamtech Press

1.1.5 MOOCs Courses Links

- Design Patterns
- Core Java Specialization
- Java Enterprise Edition Specialization
- Parallel, Concurrent, and Distributed Programming in Java Specialization
- Java Programming and Software Engineering Fundamentals Specialization
- Object Oriented Programming in Java Specialization

1.1.6 Evaluation Components

Component	Type	Marks
End Semester Examination	END SEM	20
Lab End Semester Examination		10
Skill End Semester Examination		10
TOTAL END SEMESTER		40
Continuoius Evaluation - Lab Exercise	IN-SEM FORMATIVE	10
MOOCs Review		10
Skill Continuous Evaluation		5
Global Challenges		10
TOTAL INTERNAL FORMATIVE		35
Lab In-Semester Examination	IN-SEM SUMMATIVE	10
In-Semester Examination - 1		7.5
In-Semester Examination - 2		7.5
TOTAL INTERNAL SUMMATIVE		25
GRAND TOTAL		100

1.1.7 Mapped Global Certifications

AOOP is mapped to the "Java SE 11 Developer Exam Number: 1Z0-819" and students can be certified as "Oracle Certified Professional: Java SE 11 Developer". Student will be given equivalence to 80 marks out of 100 and the only exam they have to take on campus for this course is the End-Sem theory exam. This will help student gain an O grade if they score at least 50% marks in the End-Sem theory exam.

1.2 Mode of Study: AOOD - Peer Mentoring (P)

COURSE CODE 21CS2116PA

L-T-P-S 3-0-4-4

CREDITS 6

PREREQUISITE CTOOD

1.2.1 Course Outcome

CO#	Course Outcome (CO)	PO/PSO	BTL
CO1	Apply Design Patterns & Test-Driven Development with Clean coding Techniques	PO-1, PSO-1	3
CO2	Understand the Collections & Generics over Object-oriented Programming.	PO-2, PO-5	4
CO3	Apply the various Concurrent Programming methodologies in Object Oriented Programming	PO-2, PO-5	4
CO4	Develop the applications using JDBC with PostgreSQL, Servlet & JSP	PO-2, PO-5, PSO-2	4
CO5	Analyze the various design techniques to solve any real-world problems.	PO-2, PO-5, PSO-2	4

1.2.2 Syllabus

Design Patterns: Introduction to design patterns, Structural, Creational Behavioural patterns. Decorator, Bridge, adapter and facade patterns, Singleton, factory method, abstract factory patterns, observer, command, state, iterator, chain of responsibility patterns, dependency injection. Clean Coding Techniques: Introduction to codesmells - bloaters, Object-oriented abusers, change preventers, dispensables and couplers. Refactoring techniques to remove the code smells. Test Driven Development (TDD): Introduction to TDD, Introduction to Unit Testing JUnit.

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1.2.5 MOOCs Courses Links

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- Parallel, Concurrent, and Distributed Programming in Java Specialization
- Java Programming and Software Engineering Fundamentals Specialization
- Object Oriented Programming in Java Specialization

1.2.6 Evaluation Components

Component	Type	Marks
End Semester MOOCs Evaluation Test	END SEM	10
Lab End Semester Examination		15
End Semester Project Report		15
TOTAL END SEMESTER		40
MOOCs Review	IN-SEM FORMATIVE	5
Peer Review		5
Global Challenges		20
TOTAL INTERNAL FORMATIVE		30
Lab In-Semester Examination	IN-SEM SUMMATIVE	10
Surprise Quiz		10
MOOCs Certification and Test		10
TOTAL INTERNAL SUMMATIVE		30
GRAND TOTAL		100

1.2.7 Mapped Global Certifications

AOOP is mapped to the "Java SE 11 Developer Exam Number: 1Z0-819" and students can be certified as "Oracle Certified Professional: Java SE 11 Developer". Student will be given equivalence to 90 marks out of 100 and the only exam they have to take on campus for this course is the End-Sem MOOCs exam. This will help student gain an O grade if they score at least 40% marks in the End-Sem MOOCs exam.