



GUJARAT TECHNOLOGICAL UNIVERSITY

Program Name: Bachelor of Engineering

Level: UG

Subject Code: BE05000131

Subject Name: Advanced Java Programming

w. e. f. Academic Year:	2024-25
Semester:	5
Category of the Course:	Professional Elective Course - 1

Prerequisite:	Object Oriented Programming, Core Java
Rationale:	The syllabus of Advanced Java Programming is designed to provide practical and industry-oriented knowledge of enterprise application development using Java technologies. The course introduces students to networking, database connectivity, web application development, ORM frameworks, and modern backend development using Spring Boot and REST APIs. The syllabus gradually progresses from basic server-side concepts to enterprise application development

Course Outcomes:

Sr. No.	CO statement	Marks% weightage
CO-1	Understand networking concepts and implement communication using Java sockets.	10
CO-2	Develop database-driven applications using JDBC.	20
CO-3	Develop dynamic web applications using Servlet and JSP technologies.	30
CO-4	Apply ORM concepts using Hibernate and JPA.	15
CO-5	Develop RESTful backend applications using Spring Boot framework.	25

Teaching and Examination Scheme:

Teaching / Learning Scheme (in Hours per semester)					Total Credits	Assessment Pattern and Marks					Total Marks
L	T	P	PBL	Total no of hours per semester		Theory		Tutorial / Practical			
						ESE (E)	PA / CA (M)	PA/C A (I)	PBL (I)	ESE (V)	
45	0	30	45	120	4	70	30	20	30	50	200

* *Problem-Based Learning (PBL) aims to accommodate learning beyond syllabus as per clause 9.4 of NBA manual.*



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Content:

Sr. No.	Content	Total Hrs
1	Java Networking Fundamentals: Client-server architecture, TCP/IP basics, Socket and ServerSocket programming, DatagramSocket basics, URL and URLConnection, InetAddress, Input and Output streams, simple client-server communication applications.	4
2	Advanced JDBC Programming: Need for database connectivity, JDBC architecture and drivers, Connection object, Statement and PreparedStatement, CallableStatement introduction, ResultSet handling, CRUD operations, Batch Processing, Transaction Management, SQLException handling, SQL Injection basics, Introduction to Connection Pooling.	8
3	Java Web Fundamentals, Servlet and JSP Programming: Static vs Dynamic web pages, HTTP request-response cycle, Servlet lifecycle, Request and Response handling, Request parameters and headers, ServletConfig and ServletContext, RequestDispatcher, Servlet Filters basics, Apache Tomcat overview, MVC Architecture, JSP lifecycle, JSP directives, JSP implicit objects, JSP expressions, Cookies and Session Management, HttpSession, URL Rewriting, Session Tracking Techniques, Servlet and JDBC integration, JSP and JDBC integration.	14
4	Hibernate and ORM Fundamentals: Problems with plain JDBC, Need for ORM, Introduction to JPA, Hibernate architecture and configuration, Entity mapping using annotations, Session and SessionFactory, CRUD operations using Hibernate, Persistence Context basics, Transaction management, Introduction to HQL, One-to-One and One-to-Many mapping basics.	7
5	Spring Framework, Spring Boot and RESTful Web Services: Need for frameworks, Inversion of Control (IoC), Dependency Injection (DI), Bean concept, Annotation-based configuration, Spring MVC architecture, Controllers and Request Mapping, Spring Boot introduction, REST APIs and JSON basics, REST API development using Spring Boot, HTTP Methods: GET, POST, PUT, DELETE, RequestBody and PathVariable, ResponseEntity basics, API Testing using Postman, Spring Data JPA introduction, Maven basics, pom.xml, Dependency management.	12
TOTAL		45

Suggested Specification table with Marks (Theory): (For B.E. only)

Distribution of Theory Marks (%)					
R Level	U Level	A Level	N Level	E Level	C Level
15	25	30	15	10	5

R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create and above Levels (Revised Bloom's Taxonomy)

Note: This specification table shall be treated as a general guideline for students and teachers. The actual



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distribution of marks in the question paper may vary slightly from above table.

The syllabus of *Advanced Java Programming* directly contributes to

SDG 4	Quality Education
SDG 8	Decent Work and Economic Growth
SDG 9	Industry, Innovation and Infrastructure

through development of modern enterprise applications, backend systems, API-driven software solutions, and industry-oriented programming practices.

Reference Books:

1. Java: The Complete Reference, Herbert Schildt, McGraw Hill Education
2. Core Java Volume II: Advanced Features, Cay S. Horstmann, Pearson Education
3. Head First Servlets and JSP, Bryan Basham, Kathy Sierra, Bert Bates, O'Reilly Media
4. Spring in Action, Craig Walls, Manning Publications
5. Spring Boot in Action, Craig Walls, Manning Publications
6. Hibernate in Action, Christian Bauer, Gavin King, Manning Publications
7. Effective Java, Joshua Bloch, Addison-Wesley Professional
8. JDBC API Tutorial and Reference, Maydene Fisher, Jon Ellis, Jonathan Bruce, Addison-Wesley Professional

Suggested MOOC Courses:

1. Programming in Java – NPTEL (https://onlinecourses.nptel.ac.in/noc25_cs110/preview)
2. Java Programming and Software Engineering Fundamentals (<https://www.coursera.org/specializations/java-programming>)
3. Spring Framework and Spring Boot (<https://www.udemy.com/topic/spring-framework>)

List of Learning Resources:

1. Oracle Java Tutorials (<https://docs.oracle.com/javase/tutorial/>)
2. Spring Official Getting Started Guides (<https://spring.io/guides/gs>)
3. Hibernate Documentation (<https://hibernate.org/orm/documentation/>)

List of Open Source Software

1. Eclipse IDE (<https://eclipseide.org/>)
2. Apache NetBeans IDE (<https://netbeans.apache.org/>)
3. IntelliJ IDEA Community Edition (<https://www.jetbrains.com/idea/download/>)
4. Spring Boot Framework (<https://spring.io/projects/spring-boot>)
5. Hibernate ORM (<https://hibernate.org/orm/>)
6. Apache Maven (<https://maven.apache.org/>)
7. Postman API Platform (<https://www.postman.com>)
8. Visual Studio Code (<https://code.visualstudio.com>)