22SDCS03A/22SDCS03R

JAVA FULL STACK DEVELOPMENT + MICROSERVICES

COURSE BOOK

Department of CSE

K L UNIVERSITY Green Fields

22SDCS03A/22SDCS03R - Java Full Stack Development + Microservices (Y22 Batch)

Course Coordinator Name: Mr. J. Surya Kiran (4654)

22SDCS03A L-T-P-S: 0-0-6-4 Credits: 4

CO	Description	PO/PSO	BTL
1	Students will gain a thorough understanding of Maven for project management and building automation and Hibernate for ORM in Java applications. They will learn to manage dependencies, automate builds, perform CRUD operations, write advanced queries, and handle inheritance in ORM, effectively integrating Java applications with databases.	PO5, PO9, PSO1	3
2	Students will gain a solid foundation in the Spring framework, including its architecture, core principles like Dependency Injection and Inversion of Control, and web development applications. They will be proficient in developing Spring-based web applications, performing CRUD operations, and integrating with relational databases, using Spring's features to create robust, maintainable Java applications.	PO5, PO9, PSO1	3
3	Students will gain a comprehensive understanding of Spring Boot and React JS for backend and frontend development. They will be proficient in building full-stack web applications, integrating RESTful web services, managing data with Spring Data JPA, and using React features like Hooks and Redux for state management.	PO5, PO9, PSO1	3
4	Students will understand both monolithic and microservices architectures and gain practical skills in building, deploying, and managing microservices with Spring Boot and Spring Cloud. They will be equipped to design and implement scalable, resilient, cloud-native applications using industry best practices and tools.	PO5, PO9, PSO1	3
5	Students will master advanced Spring Boot development, including unit testing, JWT-based security for authentication and authorization, SSO with Spring Security (including JWT vs OAuth2 comparison), and Aspect-Oriented Programming	PO5, PO9, PSO1	3

22SDCS03R L-T-P-S: 0-0-2-4 Credits: 2

CO	Description	PO/PSO	BTL
1	Students will gain a thorough understanding of Maven for project management and building automation and Hibernate for ORM in Java applications. They will learn to manage dependencies, automate builds, perform CRUD operations, write advanced queries, and handle inheritance in ORM, effectively integrating Java applications with databases.	PO5, PO9, PSO1	3
2	Students will gain a solid foundation in the Spring framework, including its architecture, core principles like Dependency Injection and Inversion of Control, and web development applications. They will be proficient in developing Spring-based web applications, performing CRUD operations, and integrating with relational databases, using Spring's features to create robust, maintainable Java applications.	PO5, PO9, PSO1	3
3	Students will gain a comprehensive understanding of Spring Boot and React JS for backend and frontend development. They will be proficient in building full-stack web applications, integrating RESTful web services, managing data with Spring Data JPA, and using React features like Hooks and Redux for state management.	PO5, PO9, PSO1	3
4	Students will understand both monolithic and microservices architectures and gain practical skills in building, deploying, and managing microservices with Spring Boot and Spring Cloud. They will be equipped to design and implement scalable, resilient, cloud-native applications using industry best practices and tools.	PO5, PO9, PSO1	3

Syllabus:

Maven-Introduction to Build Tools, Maven Build Tool and its advantages, Project Object Model(POM). Dependencies And Repositories, Maven Build Life Cycles, Phases and Goals, Maven Archetypes. **Hibernate**-Introduction to ORM, JPA and its advantages. JDBC Vs Hibernate. Hibernate Architecture. Hibernate CRUD operations based on Persistence Object. Hibernate Query Language (HQL)& its operations. Hibernate Criteria Query Language (HCQL) & its operations. Generator Classes in Hibernate. Hibernate Inheritance Mapping. **Spring**-Introduction to Spring and its advantages. Spring Architecture and modules. Dependency Injection and Inversion of Control with Primitive Data Types and Non-Primitive Data types using XML & Annotations. Autowiring using Dependency Injection and IoC. Spring Web Application MVC Architecture, JDBC Vs Hibernate Template. **Spring Boot**-Introduction to Spring Boot and Spring Vs Spring Boot. Spring Boot Architecture. Spring Boot Dependency Injection (DI)and Inversion of Controller (IoC). Spring Boot with Rest Controller and Controller. Spring Boot with Restful Web Services or REST API & Annotations. Spring Boot Web Application MVC Architecture. Spring Data JPA & Repositories. DAO Layer, Repository Layer and Service Layer. Spring Boot Web MVCCRUD Application with Spring Data JPA. Spring Boot Web MVC with Pagination. **React JS** Component-based Architecture, React Hooks, Fetch/Axios API and React Router. Spring Boot Rest API CRUD operations with React JS. Spring Boot Web MVC CRUD Application with React JS. **Microservices and Spring Cloud**-Monolith Architecture vs. Microservices Architecture. Microservice with RestTemplate. Introduction to Spring Cloud, Spring Cloud Config Server & Client. Service Registry & Discovery with Netflix Eureka Client & Server. API Gateway with Spring Cloud Gateway. Spring Cloud Load Balancer. Health Checks and Monitoring in Eureka using Actuator. Deploying Spring Boot Applications. Spring Boot Unit Testing with Junit Implementation. Spring Boot Security with JWT Token to implement Role based Authentication & Authorization. Single Sign-On (SSO) with Spring Security Overview. JWT Vs OAuth2Workflow. Spring Aspect Oriented Programming (AOP) Overview & Annotations. Mail Sending with Spring Boot. Spring Boot with Thymeleaf.

Textbooks:

1. Web Technologies: Concepts, Methodologies, Tools, and Applications, Information Science Reference, 4th edition, Arthur Tatnall
2. Introducing Maven: A Build Tool for Today's Java Developers 2nd Edition, Kindle Edition
3. Spring and Hibernate, Tata McGraw-Hill Education,2009, Santosh Kumar k.
4. Beginning Spring Boot 2 Applications and Microservices with the Spring Framework, Apress,1st edition, K. Siva Prasad Reddy
5. Mastering React 18: React JS From Basics to Advanced, Gourav Kumar, Kindle Edition
6. Java EE 8 Application Development, David R. Heffelfinger.
7. Microservices with Spring Boot and Spring Cloud: Build resilient and scalable microservices using Spring Cloud, Istio, and Kubernetes, 2nd Edition.

Reference Books:

1. Java The Complete Reference - Eleventh Edition, Herbert Schildt
2. J2EE: The complete reference by James Keogh, publisher: McGraw-Hill Osborne Media, 1st Edition, 2002.
3. Spring in Practice by Willie Wheeler with Joshua White, publisher: Manning, shelter Island.
4. Java Persistence with Hibernate, Manning Publications,2nd edition, Christian Bauer, Gavin King, Gary Gregory
5. Introduction to Java Spring Boot: Learning by Coding, Dave Wolf, Afua Ankomah, Jennifer Le
6. Full Stack Java Development with Spring MVC, Hibernate, jQuery, and Bootstrap - Mayur Ramgir

MOOCs:

Sl. No.	Platform	Course Name	Link
1	Coursera	Java Full Stack Developer Specialization	https://www.coursera.org/specializations/java-fullstack
2	Coursera	React Basics	https://www.coursera.org/learn/react-basics
3	Coursera	Spring Framework Specialization	https://www.coursera.org/specializations/spring-framework
4	Coursera	Building Scalable Java Microservices with Spring Boot and Spring Cloud	https://www.coursera.org/learn/google-cloud-java-spring
5	Coursera	Spring MVC, Spring Boot and Rest Controllers	https://www.coursera.org/learn/spring-mvc-rest-controller
6	Coursera	Data Structures & Backend with Java	https://www.coursera.org/learn/data-structures--backend-with-java

Global Certification:

Spring Certified Professional

https://spring.academy/paths/spring-certified-professional-2023

Softwares Required

1. JDK 8 and JDK 17+ [64 Bit]

https://www.oracle.com/in/java/technologies/downloads/

2. Eclipse IDE for Web Developers [Latest Version]

https://eclipseide.org/

3. Tomcat Web Server 8 or above [Only for Spring based Web Applications]

https://tomcat.apache.org/

4. MYSQL Workbench or PostgreSQL database (pgadmin)

https://www.mysql.com/downloads/

https://www.postgresql.org/download/

5. Visual Studio Code (VS Code)

https://code.visualstudio.com/download

6. Node JS Run Time Environment

https://nodejs.org/en/download/package-manager

7. Spring Tool Suite (STS)

https://spring.io/tools/

CO wise Session Delivery Plan

JAVA FULL STACK DEVELOPMENT + MICROSERVICES Session Plan			
#CO	**#Session**	**Topic Description**	**Module**
1	1	Software's Installation - Eclipse IDE, Tomcat Server, Spring Boot STS and MYSQL/ PostgreSQL	Maven Build Tool
1	2	Introduction to Build Tools, Maven Build Tool and its advantages, Project Object Model(POM)	
1	3	Dependencies And Repositories, Maven Build Life Cycles, Phases and Goals, Maven Archetypes	
1	4	Introduction to ORM, JPA and its advantages. JDBC Vs Hibernate. Hibernate Architecture	Hibernate JPA
1	5	Hibernate CRUD operations based on Persistence Object	
1	6	Hibernate Query Language (HQL) & its Operations	
1	7	Hibernate Criteria Query Language (HCQL) & its Operations	
1	8	Generator Classes in Hibernate	
1	9	Hibernate Inheritance Mapping	
2	10	Introduction to Spring and its advantages. Spring Architecture and modules	Spring Core and Spring Web MVC
2	11	Dependency Injection (Setter DI, Constructor DI and Interface DI)	
2	12	Inversion of Control (IoC) - Spring with BeanFactory and Application Context	
2	13	Implementation of DI with Primitive Data Types using XML & Annotations	
2	14	Implementation of DI with Non Primitive Data types using XML & Annotations	
2	15	Autowiring using Dependency Injection and IoC	
2	16	Spring Web Application MVC Architecture & Annotations. JDBC Template Vs Hibernate Template	
2	17	Spring Web MVC CRUD Application with Hibernate Template using MySQL/PostgreSQL Database	
3	18	Introduction to Spring Boot and Spring Vs Spring Boot. Spring Boot Architecture	Spring Boot, Spring Boot with Rest API, Spring Boot Web MVC
3	19	Spring Boot Dependency Injection (DI) and Inversion of Controller (IoC)	
3	20	Spring Boot with Rest Controller and Controller	
3	21	Spring Boot with Restful Web Services or REST API & Annotations	
3	22	Spring Boot Web Application MVC Architecture & Annotations	
3	23	Spring Data JPA & Types of JPA Respositories. DAO Layer, Repository Layer and Service Layer & Annotations	
3	24	Spring Boot Web MVC CRUD Application with Spring Data JPA using MySQL/PostgreSQL Database	
3	25	Spring Boot Web MVC with Pagination	
3	26	React JS Component-based Architecture, React Hooks, Fetch/Axios API and React Router	
3	27	Spring Boot Web MVC CRUD Application with React JS and Database Integration	
4	28	Monolith Architecture vs. Microservices Architecture	Microservices and Spring Cloud
4	29	Microservice with RestTemplate	
4	30	Introduction to Spring Cloud, Spring Cloud Config Server & Client	
4	31	Service Registry & Discovery with Netflix Eureka Client & Server	
4	32	API Gateway with Spring Cloud Gateway	
4	33	Spring Cloud Load Balancer	
4	34	Health Checks and Monitoring in Eureka using Actuator	
4	35	Deploying Spring Boot Applications	
5	36	Spring Boot Unit Testing with Junit Implementation	Advanced Topics (JFSD-A Only)
5	37	Spring Boot Security with JWT Token to implement Role based Authentication & Authorization	
5	38	Single Sign-On (SSO) with Spring Security Overview. JWT Vs OAuth2 Workflow	
5	39	Spring Aspect Oriented Programming (AOP) Overview & Annotations	
5	40	Mail Sending with Spring Boot	
5	41	Spring Boot with Thymeleaf	

JFSD(A) Evaluation Plan:

Evaluation Type	Evaluation Component	Weightage/Marks	
End Semester Summative Evaluation Total= 40 %	Hackathon-Final Review	Weightage	20
		Max Marks	100
	Lab End Semester Exam	Weightage	15
		Max Marks	100
	Exam – Viva	Weightage	5
		Max Marks	100
In Semester Formative Evaluation Total= 30 %	Global Challenges	Weightage	5
		Max Marks	100
	Hackathon	Weightage	10
		Max Marks	100
	Continuous Evaluation -Project	Weightage	10
		Max Marks	100
	Continuous Evaluation - Lab Exercise	Weightage	5
		Max Marks	100
In Semester Summative Evaluation Total= 30 %	Prototype Demonstration	Weightage	10
		Max Marks	100
	MOOCs Certification	Weightage	5
		Max Marks	100
	Lab In Semester Exam	Weightage	10
		Max Marks	100
	Surpize Quiz	Weightage	5
		Max Marks	100

JFSD(R) Evaluation Plan:

Evaluation Type	Evaluation Component	Weightage/Marks	
End Semester Summative Evaluation Total= 40 %	Hackathon-Final Review	Weightage	20
		Max Marks	100
	Lab End Semester Exam	Weightage	15
		Max Marks	100
	Exam – Viva	Weightage	5
		Max Marks	100
In Semester Formative Evaluation Total= 30 %	Hackathon	Weightage	10
		Max Marks	100
	Continuous Evaluation -Project	Weightage	10
		Max Marks	100
	Continuous Evaluation - Lab Exercise	Weightage	5
		Max Marks	100
	ALM	Weightage	5
		Max Marks	100
In Semester Summative Evaluation Total= 30 %	Prototype Demonstration	Weightage	10
		Max Marks	100
	MOOCs Certification	Weightage	5
		Max Marks	100
	Lab In Semester Exam	Weightage	10
		Max Marks	100
	Surpize Quiz	Weightage	5
		Max Marks	100