SYMBIOSIS INSTITUTE OF TECHNOLOGY
Symbiosis International (Deemed University)
(Established under section 3 of the UGC Act, 1956)
Founder: Prof. Dr. S. B. Mujumdar, M. Sc., Ph. D. (Awarded Padma Bhushan and Padma Shri by President of India)

Course Name: **Enterprise Application Development using Spring Boot**

Course Code: **F0003**
Course Credit: 3
Course Level: 4
Sub-Committee (Specialization): Computer Science

Learning Objectives:

1. Understand enterprise application architecture and the role of Spring Boot in building scalable, maintainable, and production-ready Java applications.
2. Develop RESTful web services using Spring Boot with layered architecture, leveraging core annotations and principles such as Dependency Injection and Inversion of Control.
3. Implement robust data persistence using Spring Data JPA, including database configuration, entity-repository relationships, and query execution.
4. Apply security and validation mechanisms in enterprise applications using Spring Security and Bean Validation to ensure secure and reliable data handling.
5. Design and deploy microservices-based applications, integrate testing practices, containerize applications using Docker, and manage deployments in cloud environments.

Pre-requisites:
Java programming, basic web technologies , HTML, CSS, JS
Course Outline:

Unit No.	Details	Hours
1	**Introduction to Enterprise Applications & Spring Boot** Fundamental concepts of enterprise application development and modern software architecture, Monolithic to microservices-based systems, maintainable enterprise solutions. Basics of the Spring ecosystem, with a focus on the Spring Boot framework. Java-based enterprise application development. Maven or Gradle, the structure of a Spring Boot application.	7
2	**Core concepts of Spring Boot** Dependency Injection (DI) and Inversion of Control (IoC). Discusses the use of key annotations such as @Component, @Service, @Repository, and @Autowired. Explains how to create RESTful web services using annotations like @RestController, @GetMapping, @PostMapping, and more, along with controller-service-repository layering in application architecture.	8
3	**Data Access with Spring Boot (Spring Data JPA)** Covers data persistence using Spring Data JPA. Includes configuration of databases, creation of entity classes, and implementation of	8

	repository interfaces for standard CRUD operations. Emphasizes writing JPQL queries and working with H2 and MySQL databases. Demonstrates the use of object-relational mapping (ORM) principles and repository-based data access patterns.	
4	**Spring Boot Security and Validation** Data validation using JSR-380 Bean Validation API with annotations such as @Valid, @NotNull, and @Size. Principles and implementation of application security using Spring Security, covering authentication and authorization mechanisms. Includes role-based access control and the use of JWT (JSON Web Token) for stateless API security.	**7**
5	**Microservices with Spring Boot** Explores the microservices architectural style and its implementation using Spring Boot and Spring Cloud. Discusses concepts such as service discovery with Eureka, API gateway using Spring Cloud Gateway, and inter-service communication with Feign clients or REST templates. Covers resilience, centralized configuration, and deployment patterns relevant to microservice-based applications	**7**
6	**Deployment, Testing, and Real-World Practices** Details software testing approaches, including unit testing and integration testing using Spring Boot's testing annotations (@WebMvcTest, @DataJpaTest). Introduces containerization using Docker and basic CI/CD practices. Cloud deployment methods (e.g., Heroku, AWS), application packaging, and real-world development practices, including logging and configuration management.	**8**

Recommended Books:

Sr. No.	Book title	Authors	Publishers
1	Spring in Action (6th Edition)	Craig Walls	Manning Publications
2	Spring Boot: Up and Running: Building Cloud-Native Java and Kotlin Applications	Mark Heckler	O'Reilly Media
3	Cloud Native Java: Designing Resilient Systems with Spring Boot, Spring Cloud	Josh Long, Kenny Bastani	O'Reilly Media

Pedagogy:
Hands-on Practical Sessions
Group Projects
Industry Use-Cases and Problem Solving
Evaluation:

A. Continuous Assessment

Practical Assessments
Projects
Unit Test

Course Outcomes:

Student will be able to:

CO1: Describe the architecture of enterprise applications and explain the features of Spring Boot that simplify enterprise Java development. (Understand)

CO2: Develop RESTful web services using Spring Boot by applying principles such as dependency injection and layered architecture. (Apply)

CO3: Design and implement data access layers using Spring Data JPA, including entity modeling and custom queries. (Apply)

CO4: Apply input validation techniques and implement authentication and authorization using Spring Security and Bean Validation. (Apply)

CO5: Build and deploy microservices using Spring Boot and Spring Cloud components like Eureka, API Gateway, and Feign clients. (Create)

CO6: Perform testing, containerization using Docker, and deploy Spring Boot applications to cloud platforms. (Apply/Create)

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Articulation Matrix:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	2	2		1					2	2		1	3	3
2	1			1	3				2	2		1	3	3
3	2			2	3				2	2		2	3	3
4	1			2	3				2	2		2	2	3
5	1			2	3				2	2		2	2	3
6	1			2	3				2	2		2	3	3

Benchmarked against similar courses in other national/ international universities /organizations:

Sr. No.	Name of the Course	Name of University where it is offered
1.	Developing Enterprise	University of California, Berkeley,

	Applications with Spring Boot	USA
2.	Building Scalable Enterprise Applications with Spring Boot	Indian Institute of Technology (IIT), Bombay, India

Name of the experts designing the course

Sr. No.	Name	Designation	Organization/ Institute
1	Dr. Sashikala Mishra	Professor	SIT, Pune
2	Vijay Chaudhry	Senior Manager	Tech Mahindra
3	Dr. Deepali Vora	Professor	SIT, Pune