	- Integrate Java Server Pages (JSP) for dynamic web page generation
Weeks 11-15	**Spring Framework and Full-Stack Development**
	- Implement basic Spring features (beans, configurations, application context)
	- Develop web applications using Spring MVC
	- Create RESTful APIs with Spring Boot and Spring MVC
	- Showcase full-stack development with a functional and well-documented web application
Weeks 16-20	**Testing, Deployment, and Finalization**
	- Integrate front-end technologies with Spring Boot backend
	- Develop a user-friendly front-end interface
	- Test and debug the application
	- Deploy the application on a suitable cloud platform
	- Troubleshoot deployment issues
	- Finalize the project, including code, deployment, and presentation documentation
	- Present the project outcomes and deliver a final report
	- Discuss possible extensions and improvements

Weekly Plan for Students

#	Weekly Learning Outcomes	Weekly Milestone	Self Paced Course

Week 1	• Requirements Analysis and Documentation
	• Understand functional and non-functional requirements
	• Design Layout of the Prototype which is required for the project Initiation
	• Install Development Tools
	• Project Management
	  • Software Development
	  • Agile Methodology
	  • Wireframing and Prototyping
		• By the end of this week, Understanding Project Requirements
		• Thorough understanding of project requirements, stakeholders, and objectives.
		• Ability to define clear project goals, target audience, and essential features.
		• Wireframes and User Flow Diagrams
		• Creation of comprehensive wireframes and user flow diagrams.
		• Functional and Non-functional Requirements.
			• https://skills.yourlearning.ibm.com/activity/URL-FCFCC25FD8A9?channelId=CNL_LCB_1616447372894
			• https://skills.yourlearning.ibm.com/activity/URL-EAA89F6480FA?channelId=CNL_LCB_1616447372894

	• Introduction to UX design • Build a Story based design • **Masterclass 1: Understanding Project Management and SDLC**	• Collection of comprehensive functional and non-functional requirements.	
Week 2	• Introduction to Java • Setting up Development Environment • Understanding Java basic syntax, Data Types • Variables and Constants • Operators • Control Flow Statements • Arrays • Methods • **Master Class 2: Java Jumpstart: Foundations of Java Programming**	• Basic Java Programming Proficiency. • Write and execute basic Java programs effectively. • Demonstrate a strong understanding of arrays and methods for data manipulation. • Work with collections of data using arrays. • User Input and Output Handling. • Design and implement Java programs that involve user input, data processing, and output generation. • Showcase the ability to apply Java programming principles in practical scenarios. • Debugging and Troubleshooting. • Gain skills in debugging and troubleshooting common programming errors.	• https://www.codecademy.com/learn/learn-java
Week 3	• Object-Oriented Programming (OOP) Concepts • Inheritance • Polymorphism • Interfaces • Abstract Classes • Exception Handling • Error Handling and Debugging • **Master Class 3: OOPS Concept**	• By the end of this week, students should be able to complete the following: • OOP Principles • Design well-structured Java code using OOP principles effectively. • Demonstrate proficiency in implementing inheritance, polymorphism, and interfaces. • Abstract Classes and Code Reusability	• https://www.codecademy.com/learn/learn-java • https://skills.yourlearning.ibm.com/activity/URL--YSX-S5FCCI

	and Exception Handling in Java	• Design and implement abstract classes proficiently. • Understand their role in providing blueprints for derived classes and promoting code reusability. • Exception Handling Expertise • Gain a deep understanding of exception handling in Java. • Become familiar with Java's exception hierarchy, try-catch blocks, and best practices for handling different types of exceptions.	
Week 4	• Collections Framework • Multithreading Concepts • Lambda expressions and streams • Stream API for processing collections • enabling powerful data manipulation operations • **Master Class 4: Streamlining Java: Lambda Expressions and Stream API**	• Students will master using lambda expressions and streams in Java for efficient data manipulation. • They will understand how lambda expressions work for concise functional programming. • Students will learn to use the Stream API to process collections effectively. • They'll perform operations like filtering, mapping, reducing, and parallel processing with streams. • Students will improve their Java applications' readability, maintainability, and performance using streams. • This milestone shows advanced proficiency in modern Java features for robust data manipulation.	• https://www.redbooks.ibm.com/abstracts/crse0300.html • https://www.codecademy.com/learn/learn-java
Week 5	• HTML Fundamentals	• Students will demonstrate proficiency in HTML syntax, semantic markup,	• https://skills.yourlearning.ibm.com/activity/URL-51AF1482839B

	• Introduction to HTML • HTML Syntax • Semantic HTML • Creating Basic Web Pages • Validating HTML • HTML Forms, tables, Multimedia • Form Validation • CSS Basics, CSS Box Model • Styling Text • **Master Class 5: HTML Essentials: Mastering the Fundamentals**	and creating basic web pages. • They will apply learned concepts to develop structured and semantically meaningful web pages. • Students will integrate multimedia content like images, audio, video, and iframes using HTML tags. • They'll utilize HTML5 semantic elements to improve document structure, accessibility, and SEO. • Students will learn CSS syntax, selectors, properties, and values for styling HTML elements. • They will apply the CSS box model concept to control spacing, sizing, and positioning of elements. • Students will style text elements using CSS properties for font customization, alignment, and decoration. • They'll acquire advanced CSS skills for creating modern, responsive, and visually appealing web layouts using Flexbox, CSS Grid, and CSS frameworks	• https://skills.yourlearning.ibm.com/activity/ILB-EKVDPYPKGMKV155G
Week 6	• JavaScript Basics Introduction to JavaScript • Variables and Data Types • Operators and Expressions • Control Flow, Functions • Arrays and Objects • DOM Introduction • Events and Event Handling • Error Handling • **Master Class 6: CSS Unleashed:**	• By the end of this week, • Explore JavaScript fundamentals like variables, data types, operators, expressions, control flow, and functions. • Integrate CSS and JavaScript to create interactive web elements, dynamic styles, animations, and user-friendly features. • Apply learned concepts in a project to develop a responsive web interface with dynamic content and interactivity.	• https://skills.yourlearning.ibm.com/activity/URL-4FF4AA6A2C77

	Exploring Style and Design, From Basics to Advanced Techniques	• Apply JavaScript concepts in another project to create dynamic content, handle user interactions, manipulate DOM elements, and implement error handling for a functional web application.	
Week 7	• JavaScript DOM Manipulation • DOM Manipulation Basics • Selecting DOM Elements • Modifying DOM Elements • Creating and Removing Elements • Traversing the DOM • JavaScript DOM Events • **Master Class 7: JavaScript Fundamentals: Building Blocks of Dynamic Web Development, DOM**	• By the end of this week, • Learn about the Document Object Model (DOM) structure, including nodes, elements, attributes, and relationships. • Explore methods for selecting DOM elements using selectors like IDs, classes, tags, attributes, and query selectors. • Practice modifying DOM elements dynamically with JavaScript by changing attributes, styles, content, classes, and event listeners. • Learn to create new DOM elements, add them to the document, manipulate their properties, and remove elements from the DOM hierarchy. • Understand DOM traversal techniques such as navigating parent, child, and sibling elements, accessing node properties, and iterating through DOM collections.	• https://skills.yourlearning.ibm.com/activity/MDL-264
Week 8	• Introduction to Bootstrap • Understanding and setting up Bootstrap • Bootstrap Components, Grid System • Advanced Bootstrap • Customizing Bootstrap	• By the end of this week, • Understand the basics of Bootstrap, including its purpose, features, and advantages in web development. • Explore Bootstrap's pre-designed components like navbar, cards, and modals, and its grid system for responsive layouts. • Customize Bootstrap styles, colors, typography, and create custom layout	• https://skills.yourlearning.ibm.com/activity/MDL-266

	• Bootstrap Layout Components • Responsive Design and themes with Bootstrap • Best Practices and Optimization • **Master Class 8: Bootstrap Demystified: Building Responsive Web Interfaces**	components using Bootstrap classes and utilities. • Apply responsive design principles with Bootstrap for mobile-friendly layouts and explore theme customization options.	
Week 9	• Familiarizing with DBMS • Working with MySQL • CRUD Operations • Connecting with Server • JDBC API • **Master Class 9: Database design principles, SQL queries, JDBC implementation**	• By the end of this week, student will be able to: • Understand the basics of Database Management Systems (DBMS) and their importance. • Install and use MySQL, including creating, modifying, and deleting databases and tables. • Practice CRUD operations (Create, Read, Update, Delete) in MySQL using SQL queries. • Learn to establish a connection between a Java application and a MySQL server. • Study and use the JDBC API for Java database interactions, including executing SQL queries and managing data.	• https://skills.yourlearning.ibm.com/activity/URL-96CD3FFFA8E5
Week 10	• Introduction to GitHub • Collaborating on GitHub • GitHub Branching Strategies • Basics of Servlet • JDBC connectivity using Java • Java Server Pages (JSP)	• By the end of this week, students will be able to: • Understanding Git and reposirories • Gain a comprehensive understanding of Java web development, covering Servlet basics, JDBC connectivity with Java, and Java Server Pages (JSP).	• https://skills.yourlearning.ibm.com/activity/URL-RGOJ5YH7EVK?channelId=CNL_LCB_1616516409884 •

	• **Master Class 10: Advanced Concepts and Best Practices**	• Develop a fully functional web application integrating these concepts: creating servlets to handle HTTP requests and using JDBC to interact with a database for data retrieval and manipulation.	
Week 11	• Expression Language (EL) • JSTL • Java Persistence API (JPA) • **Master Class 11: Employability Skills**	• By the end of this week, students will be able to: • Build a dynamic web application using Java technologies. • Integrate Expression Language (EL) and JavaServer Pages Standard Tag Library (JSTL) into JSP for efficient data handling. • Use EL to access and modify data in JSP, and leverage JSTL for tasks like loops and database interactions. • Utilize Java Persistence API (JPA) for managing data persistence, including CRUD operations in the database. • Showcase the ability to create dynamic and data-centric web applications with these Java technologies.	• https://skills.yourlearning.ibm.com/activity/ILB-VQNPGXKKRPWVPKJM
Week 12	• Basics of the Spring framework • Dependency injection and inversion of control (IoC) principles • Auto-configuration and convention-over-configuration features • Spring MVC	• By the end of this week, students will be able to: • Understand the core concepts and components of the Spring framework. • Learn about its architecture and how it simplifies Java application development. • Master the concepts of dependency injection and inversion of control (IoC).	• https://www.udemy.com/course/spring-framework-video-tutorial/

	• Spring RESTful Web Services • **Master Class 12: Employability Skills**	• Practice implementing IoC in Spring applications for loosely coupled and maintainable code. • Explore Spring Boot's auto-configuration. • Dive into Spring MVC (Model-View-Controller) architecture for building web applications. • Understand the role of controllers, views, and models in Spring MVC. • Learn about developing RESTful Web Services using Spring framework.	
Week 13	• Spring Boot Basics • Introduction to Spring Boot • Auto-Configuration • Starter Dependencies • Spring Boot Web Development • Spring Boot Data Access • **Master Class 13: Spring Boot Essentials: Rapid Development**	• By the end of this week, students will be able to: • Understand the basics of Spring Boot and its purpose in simplifying Java application development. • Learn about the introduction to Spring Boot, including its history and key features. • Explore auto-configuration in Spring Boot and how it automates setup and configuration. • Understand starter dependencies in Spring Boot and how they provide pre-configured dependencies for common tasks. • Dive into Spring Boot web development, including building web applications and RESTful APIs using Spring Boot.	• https://www.udemy.com/course/spring-framework-video-tutorial/
Week 14	• Getting Familiar with RESTFful API	• By the end of this week, students will be able to:	• https://www.udemy.com/course/restful-web-services-with-spring-

	• RESTful API, Characteristics • Difference between REST API and RESTful API • **Master Class 14: Restful APIs**	• Familiarize yourself with Restful API basics, understanding its purpose and structure in web development. • Learn about the characteristics of Restful API, such as statelessness, uniform interface, and resource-based URLs. • Differentiate between REST API and RESTful API, understanding their similarities and differences in design and functionality. •	framework-a-quick-start/
Week 15	• Methods of RESTful API (GET, POST, PUT, DELETE) • Spring Boot JDBC connection • Implement RESTful API endpoints in Spring Boot • **Master Class 15: Employability Skills**	• Explore the methods used in RESTful API, including GET for retrieving data, POST for creating data, PUT for updating data, and DELETE for deleting data. • Implement Spring Boot JDBC connection, understanding how to connect Spring Boot applications with databases using JDBC. • By the end of this week, students will be able to: • Test endpoints using Postman or similar tools to ensure functionality. • Integrate authentication mechanisms like JWT (JSON Web Tokens) or Spring Security into Spring Boot. •	• https://fullstackopen.com/en/part0/fundamentals_of_web_apps
Week 16	• User Authentication and Authorization • Understand the architecture of a full-stack application	• By the end of this week, students will be able to: • Implement user authentication for accessing protected endpoints.	• https://business.tutsplus.com/courses/master-powerpoint-15-essential-tips?_ga=2.67661270.658268391.1592849702-

	• Integrate front-end technologies with the Spring Boot backend • Front-end user interface. • **Master Class 16: Secure Server-Side Validation: Ensuring Data Integrity**	• Configure role-based authorization to control user access to specific resources. • Practice integrating databases with applications for effective data storage and retrieval. • Implement business logic to process and manipulate data efficiently. • Design and create front-end interfaces for a seamless user experience.	1543735797.1592586857
Week 17	• Testing and Debugging • Unit testing, integration testing, and end-to-end testing of the full-stack application • Troubleshoot with all test cases • Use debugging tools and techniques to fix bugs • **Master Class 17: Employability Skills**	• By the end of this week, students will be able to: • Conduct integration testing to ensure different parts work together with front-end and back-end. • Explore testing and debugging techniques to ensure application reliability and quality. • Execute end-to-end testing to validate the entire application flow. • Identify issues found during testing. • Analyze problems and their causes. • Apply debugging techniques to fix bugs efficiently.	• https://skills.yourlearning.ibm.com/activity/URL-EEUNAIZOWRU?channelId=CNL_LCB_1616516409884
Week 18	• Introduction to cloud platforms • Deployment to Cloud Platform • Configure server environments. • Set up databases. • Manage application logs, and monitor performance metrics	• By the end of this week, students will be able to: • Understand the basics of cloud computing and different cloud service providers. • Explore deployment processes and tools for cloud platforms. • Deploy a sample application to a chosen cloud platform. • Set up server configurations, including	• https://skills.yourlearning.ibm.com/activity/PLAN-2EC3A305F2C3 •

	• **Master Class 18: Introduction to Cloud platform**	security settings and resource allocation. • Set up databases on the cloud platform	
Week 19	• Introduction to Web Hosting • Setting Up Environment and Infrastructure • Students need to deploy • project to final field environment to the free cloud providers like 'OOOwebhost' etc. • Students will prepare deliverables for reporting and presentations • **Masterclass 19: Enhancing the presentation skills**	• By the end of this week, students will be able to incorporate all the required suggestions. • Understand the concept of web hosting and its role in making websites accessible online. • Deploy the project to a staging or beta environment for testing by users or stakeholders. • Ensure the deployment process is smooth and the application functions correctly in the real environment. • Deploy the project to a free cloud provider like 'OOOwebhost' for final hosting	• https://www.indeed.com/career-advice/career-development/tips-for-giving-a-great-presentation
Week 20	• Showcase of Final project	• After the completion of week, student will be able to showcase their final project and modify according to peer team suggestions.	•

Project based evaluation for Students

Project-based evaluation	**Score**	**Milestones to be tracked by the evaluator**
Mid Evaluation (after 10 weeks)	50	Understanding & Implementation of the Problem statement (20) Achievement of weekly milestone (15) Q n A on coding / Model / Weekly milestone (15)
End Evaluation (after 20 weeks)	50	Implementation of the Project (Compete document, source code, ppt etc)(25) Achievement of weekly milestone(15) Q n A on coding / Model / Real world Implementation (15)