School of Computer Science and Engineering
Dept. of Computer Science and Engineering
COURSE PLAN
Academic Year 2025-26 ODD SEMESTER

School/Department of Students	**PSCS**
Name of the Program(s) of Students	**B.Tech (All CSE and Allied)**
PRC Approval Ref. No.	**PU/AC-21.5/SoCSE2/CSE/2023-2027**
Semester/Year	**VI**
Course Code & Name	**CSE3427 JAVA FULL STACK DEVELOMENT**
Credit Structure (L-T-P-C)	**2-0-2-3**
Contact Hours	**60**
Course In-Charge (IC)	**Dr T Ramesh, Dr Sivaramakrishnan S, Ms. Poonam Nilesh Yadav**
Course Instructor(s)	**Mr. Sriram Parabrahma Chari, Dr. Sreelatha P K, Ms. Vinitha C, Ms. Radhika Sreedharan, Ms. Chethana K, Ms. Neha Seirah Biju, Ms. Shaik Salma, Mr. Raghava Reddy S, Dr. Ziaur Rahman, Dr. Denslin Brabin, Dr. Taranath NL, Mr. Manan Kumar Gupta, Dr. Ruhin Kouser R, Mr. Sakthi S, Mr. Girish Kumar B C, Mr. Mohamed Shakir. Mr. Shankar J, Ms. Suma N G, Dr. Jagadevi Bakka, Ms. Ramabai, Mr. Bikram Sarkar, Mr. Sunil Kumar Sahoo, Ms. Impa B H, Dr. Afroz Pasha, Dr. Ranjitha P, Mr. Jerrin Joe Francis, Ms. Meghana C, Ms. Anupama M Patil, Ms. Sunitha B J, Mr. Sachin V Raikar, Ms. Alina Raheen, Dr. Vignesh R, Ms. Dumpala Swetha, Ms. Varalakshmi T, Dr. Mohammed Mujeerulla**
Course URL	**https://presidencyuniversity.linways.com**

1. COURSE PRE-REQUISITES:
Problem solving using Java CSE1001 *Advanced Java Programming CSE3146*

2. COURSE DESCRIPTION:
This advanced level course enables students to perform full stack development using Java, with emphasis on employability skills. The key technologies used for Full Stack development is based on either Java technology or .NET technology. In this course, the focus is on using Java, and the related technologies/tools like Java EE, Java Persistence, Hibernate, Maven, Spring Core, etc. On successful completion of this course, the student shall be able to pursue a career in full-stack development. The students shall develop strong problem-solving skills as part of this course.

3. COURSE OBJECTIVES:

This course is designed to improve the learners' EMPLOYABILITY SKILLS by using PROBLEM SOLVING Methodologies.

4. COURSE OUTCOMES:

TABLE 1: COURSE OUTCOMES		
CO Number	**Statement of CO** *On successful completion of the course the students shall be able to*	**Blooms Cognitive Level**
CO1	Practice the use of Java for full stack development.	Apply
CO2	Design web applications using Java EE.	Apply
CO3	Solve simple applications using Java Persistence and Hibernate.	Apply
CO4	Apply concepts of Spring to develop a Full Stack application.	Apply
CO5	Illustrate automation tools like Maven, Selenium for Full Stack development.	Apply

5. MAPPING OF COURSE OUTCOMES WITH PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

5.1 *PROGRAM OUTCOMES*:

On successful completion of the Program, the students will be able to:

PO1.   **Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.**

PO2.   **Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.**

PO3.   **Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.**

PO4.   **Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and**

interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. **Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.**

PO6. The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. **Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.**

PO10. **Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.**

PO11. **Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.**

PO12. **Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.**

TABLE 2a: CO-PO Mapping											
CO. No	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	M	H	H	M	H				M	L	M	M
CO2	M	H	H	M	H				M	L	M	M
CO3	M	H	H	M	H				M	L	M	M
CO4	M	H	H	M	H				M	L	M	M
CO5	M	H	H	M	H				M	L	M	M

5.2 PROGRAM SPECIFIC OUTCOMES:

On successful completion of the Program, the students will be able to:

PSO1	Disciplinary knowledge: Capable of demonstrating comprehensive knowledge and understanding of Computer Applications, Animation, Augmented and Virtual Reality, Gaming and Graphics.
PSO2	Problem Solving: Identify, formulate and apply appropriate techniques in the areas related to Software development, Augmented and Virtual Reality, Gaming and Graphics and related domains of varying complexities in real-time applications.
PSO3	Design/development of Activities: Conceive, Design and Develop various activities of Computer Applications, Augmented Reality, Virtual Reality, Gaming and Graphics.

TABLE 2b: CO-PSO Mapping			
CO Number	**PSO1**	**PSO2**	**PSO3**
CO1	M	H	H
CO2	M	H	H
CO3	M	H	H
CO4	M	H	H
CO5	M	H	H

6. COURSE CONTENT:

Module Number	Module Name	Number of Sessions
1	**Module:1: Introduction** **[Apply]** Review of Java; Advanced concepts of Java; Java generics; Java IO; New Features of Java. Unit Testing tools.	12
2	**Module: 2: Java EE Web Applications** **[Apply]** Introduction to Eclipse & Tomcat; JSP Fundamentals; Reading HTML form Data with JSP; State Management with JSP; JSP Standard Tag Library - Core & Function Tags; Servlet API Fundamentals; ServletContext, Session, Cookies; Request Redirection Techniques; Building MVC App with Servlets & JSP; Complete App - Integrating JDBC with MVC App.	12

3	**Module:3: Java Persistence using JPA and Hibernate [Apply]** Fundamentals of Java Persistence with Hibernate; JPA for Object/Relational Mapping, Querying, Caching, Performance and Concurrency; First & Second Level Caching, Batch Fetching, Optimistic Locking & Versioning; Entity Relationships, Inheritance Mapping & Polymorphic Queries; Querying database using JPQL and Criteria API (JPA)		12
4	**Module: 4: Spring Core [Apply]** Spring Core, Spring MVC, Spring Boot REST API; Understanding Spring Framework; Using Spring MVC; Building a Dat		12
5	**Module: 5: Automation Tools [Apply]** Introduction to Automation Tools; Apache Maven: Maven Fundamentals, Software Setup – Command line and Eclipse, pom.xml and Directory Structure, Multi-Module Project Creation, Scopes, Dependency Management, Profiles; Functional/BDD Testing using Selenium, Selenium Fundamentals and IDE, Selenium WebDriver, Installation and Configuration, Locating WebElements, Driver Commands, WebElement Commands.		12

REFERENCE MATERIALS:
Text Books:
   T1: Mayur Ramgir, "Full Stack Java Development with Spring MVC, Hibernate, jQuery , and Bootstrap", 1st Edition, Wiley Publication, 2020.
 Reference Books:
   R1. Chris Northwood, "The Full Stack Developer: Your Essential Guide to the Everyday Skills Expected of a Modern Full Stack Developer", 1st edition, APress,2018.
   R2 Herbert Schildt, "Java The complete reference", 11th Edition, ORACLE, 2020
Online Resources
   1. https://docs.oracle.com/javaee/6/tutorial/doc/geysl.html
   2. https://twww.tutorialspoint.com/jpa/index.htm
   3. https://docs.spring.io/spring-framework/docs/current/reference/html/core.html
   4. https://www.javatpoint.com/hibernate-tutorial
   5. https://maven.apache.org/
   6. https://www.selenium.dev/

7. DETAILED SCHEDULE OF INSTRUCTION

TABLE 3: LESSON PLAN			
Session Number	**Topic**	**Sub-Topic**	**CO Number**	**Reference**

1.	Program Integration & Course Integration	Overview of the Course, Scopes and Opportunities of Java Full Stack	CO1	T1

Module 1

2.	Java IO	Stream, I/O classes.	CO1	T1-(CH16.5,Pg.822-826)
3.	Java generics	Generic method and class with example.	CO1	
4.	New Features of Java – Annotation	Built in annotations, different types of annotation.	CO1	T1-(CH16.5,Pg.832-837)
5.	New Features of Java - Lambda Expression	Lambda expression and its uses.	CO1	
6.	Unit Testing tools – Junit	Functional testing, functional testing using JUnit.	CO1	T1-(CH16.5,Pg.832-837)
7.	Discuss about overview of the course and Laboratory Familiarization	Recall the execution of basic java programs.	CO1	Lab Sheet
8.	Experiment No 1: Illustrate the concept of Collection, Serialization and deserialization with file.	Practice the concept of Serialization and deserialization in a console application.	CO1	Lab Sheet

Module 2

9.	Servlet API, ServletContext fundamentals	Advantages of servlet, Servlet Life Cyle and its architecture.	CO2	T1-(CH1.2,Pg.1-3)
10.	JSP Fundamentals, JSP Standard Tag Library, Core & Function Tags	Types of scripting elements in JSP, Tabulate JSP implicit objects	CO2	T1-(CH16.2,Pg.489-501)
11.	Building MVC App with Servlets & JSP	Advantages of MVC. MVC architecture	CO2	T1-(CH16.5,Pg.508-518
12.	Experiment No 2: Demonstrate with a java console application that connect with MySQL database and perform database operations	Use JDBC ODBC drivers to connect the MySQL database and execute SQL commands	CO2	Lab Sheet
13.	Experiment No 3: Demonstrate with a web application that connect with MySQL database and perform database operations	Examine the DDL and DML commands with MySQL database and create a console to perform transactions on it.	CO2	Lab Sheet
14.	Experiment No. 4: Study JUnit functional testing tool and create test cases to test with an application.	Use unit testing to create test cases on Junit4 to find the maximum number for array using Eclipse IDE	CO2	Lab Sheet

15.	MID TERM EXAM MODULE-1 AND 2 (CO1 & CO2)			
16.				
Module 3				
17.	Fundamentals of Java Persistence with Hibernate	Advantages of hibernate framework. Hibernate architecture	CO3	T1-(CH1.6,Pg.25-26)
18.	JPA for Object/Relational Mapping	ORM, Steps involved in ORM	CO3	T1-(CH1.3,Pg.15-19)
19.	Querying, Caching	HQL, Advantages of HQL.	CO3	T1-(CH1.3,Pg.20-24)
20.	Performance and Concurrency	Describe how to improve the performance.	CO3	T1-(CH5.1,Pg147-170)
21.	First & Second Level Caching, Batch Fetching	First level caching, Second level caching	CO3	T1-(CH9.1.,Pg266-280)
22.	Optimistic Locking & Versioning	Optimistic locking, Versioning	CO3	T1-(CH11.1.,Pg.327-333)
23.	Entity Relationships, Inheritance Mapping	Entity relationship in HQL, ER in hibernate	CO3	T1-(CH11.5.,Pg.342-352
24.	Polymorphic Queries, Querying database using JPQL, Criteria API (JPA)	Polymorphic Query.	CO3	T1-(CH16.5,Pg.508-518
25.	Experiment No. 5: Illustrate the Servlet API to develop a web application connect with a database.	Use Servlet API to develop a web application that connects with MySQL database.	CO3	Lab Sheet
26.	Experiment No. 6: Illustrate the JSP develop a web application connect with a database.	Apply JSP to develop a web application that connect with MySQL database	CO3	Lab Sheet
27.	Experiment No. 7: Demonstrate MVC architecture with simple and integrate with JDBC.	Use MVC design pattern to develop a small web application to validate the user name and password.	CO3	Lab Sheet
Module 4				
28.	Understanding Spring Framework	Spring framework architecture.	CO4	T1-(CH15.3.,Pg.452-460)
29.	Using Spring Boot for Rapid Development, Spring Boot REST API Spring MVC	Spring and Spring Boot.	CO4	T1-(CH19.1,Pg.615-622)

30.	Using Spring MVC; Building a Database Web App with Spring and Hibernate	MVC applications with database.	CO4	T1-(CH16.5,Pg.508-518
31.	Spring AOP (Aspect Oriented Programming)	AOP and its uses.	CO4	T1-(CH16.5,Pg.508-518
32.	Spring Security	Spring Security.	CO4	T1-(CH16.5,Pg.508-518
33.	Experiment No. 8: Demonstrate Hibernate framework with ORM.	Apply Hibernate ORM concept to develop a console application using Eclipse IDE	CO4	Lab Sheet
34.	Experiment No. 9: Apply Spring Boot framework to perform Create database and table operations on data base	Apply spring framework to build a simple Spring Application, which will connect the database file	CO4	Lab Sheet
35.	Experiment No. 10: Apply Spring Boot framework to perform Update and Delete operations on data base	Use spring framework in eclipse IDE to create a simple application.	CO4	Lab Sheet
Module 5				
36.	Apache Maven: Maven Fundamentals, Software Setup – Command line and Eclipse	The tasks of Maven	CO5	T1-(CH16.5,Pg.508-518
37.	pom.xml and Directory Structure	POM, Maven directory structure	CO5	T1-(CH16.5,Pg.508-518
38.	Multi-Module Project Creation.	Maven project and it advantages.	CO5	T1-(CH16.5,Pg.508-518
39.	Scopes, Dependency Management, Profile	Maven repository.	CO5	T1-(CH16.5,Pg.508-518
40.	Selenium Fundamentals and IDE	The automation testing tools for functional automation.	CO5	T1-(CH16.5,Pg.508-518
41.	Selenium WebDriver, Installation and Configuration	Selenium Webdirver	CO5	T1-(CH16.5,Pg.508-518
42.	Locating WebElements, Driver Commands,	Selenium feature and limitations, Tool suite	CO5	T1-(CH16.5,Pg.508-518
43.	Experiment No. 11: Study Spring Boot with AOP.	Use SpringBoot to create a simple application in Maven project	CO5	Lab Sheet
44.	Experiment No. 12: Study of Spring MVC	Apply Spring MVC to build application using Maven project.	CO5	Lab Sheet

45.	Experiment No. 13: Study of Spring RESTful Web Service	Develop a RESTful web services project with Spring Boot and include in a web application.	CO5	Lab Sheet
46.	Experiment No. 14: Develop E-Commerce website using Hibernate/ SpringBoot tools	Develop a RESTful web services project with Spring Boot and include in a web application.	CO5	Lab Sheet

The main pedagogical methods in the course are as follows:
- Lecture mode.
- Power Point Presentation.
- Experimental Learning
- Simulation Practical system case study/Model Design.

TABLE 4: SPECIAL DELIVERY METHOD			
S. No	**Session Number**	**Subtopic (as per lesson plan)**	**Pedagogical Method**
1.	L2	Byte and Character Stream	Self Learning/Chalk and Talk
2.	L7	Installation and Demo of Eclipse	Self Learning/Chalk and Talk
3.	L10	Building MVC App with Servlets & JSP	Participative Learning/Chalk and Talk
4.	L31	Apache Maven Tool	Technology enabled learning /Chalk and Talk
5.	L35	Selinium Tool	Participative Learning /Chalk and Talk

8. ASSESSMENT SCHEDULE

TABLE 5: ASSESSMENT SCHEDULE						
Sl. No	**Assessment Type**	**Coverage**	**CO Number(s)**	**Duration in Minutes**	**Marks**	**Weightage**
1.	Continuous Assessment-I	Module-1	CO1	60	20	10%
2.	Midterm Exam	Module- 1&2	CO1 & CO2	90	50	25%
3.	Continuous Assessment -II	Module- 3& 4	CO3 & CO4	60	20	10%
4.	Continuous Assessment - III (Lab Exam)	Module 5	CO5	60	10	5%
5.	End Term Examination	Module-1,2,3 4 & 5	CO1, CO2, CO3, CO4 & CO5	180	100	50%

9. COURSE CLEARANCE CRITERIA:

This is in accordance with the Academic Regulations of the University and the Program Regulations and Curriculum of the respective program.

10. SAMPLE QUESTIONS:

Sl. No	Question	Marks	CO Number	Blooms Cognitive Level
	TABLE 6: SAMPLE QUESTIONS			
1	Create a weather detailed component using Angular. Enter city name to get the weather details. The component must have following functionalities: 1. An array of objects is passed as a prop to the component, where each object is a weather record for a single city. The object has 4 properties : name [string], temperature in the city [string], wind in the city [string], humidity in the city [string] 2. There is an input field where the user can type the name of city to get the details of weather.	5	CO1	Apply
2	An organization is managing their leave application process manually. Develop an application for managing leaves through online. Employee can apply leave though application and check their available balance. Request should forward to the manager of the employee. He/She can approve/reject the application. Employee can check the response using their login.	5	CO1	Apply
3	University is organizing an intra college cultural festival. It consists of more than 100 different events. All events details should be displayed with all rules and regulations of the event. Students can register for any event with team members. Last date for the registration process also should be mentioned in every event page. Develop an application to demonstrate this.	5	CO2	Apply
4	A housing society is collecting maintenance charge from all residents of the society. The amount is spending for various activities of the society. Develop an application for managing their fund and collecting fund also through online. Any resident wants to see the monthly expenditure of the society, they have to view through the application.	5	CO2	Apply
5	Explain fetch type Lazy and eager. For a many-to-many mapping between two tables product and customer, what will be the fetch-type. Implement both the table using hibernate. Also explain the	5	CO3	Apply

	various annotations 5used in respective object-relationship mapping.			
6	Design the following web application as per MVC architecture. A shopping store has to keep a product catalogue. Customers can visit the store to know the details about the product and process purchase order. Define the model classes, Service classes and suitable controllers using spring MVC module.	5	CO3	Apply
7	Create a module in java, create a service that will load the data from a http server. Register the service within that module. Integrate the modules and test it.	5	CO4	Apply
8	Create a module using Maven Project and test it with Selinium test tool.	5	CO5	Apply

11. MAPPING WITH SUSTAINABLE DEVELOPMENT GOALS (SDGs):

TABLE 7: SDG MAPPING			
S. No	Topic	SDG Number	Justification
1	Industry, Innovation and Infrastructure	SDG 9	Java full-stack development strengthens SDG 9 by building scalable digital infrastructure that drives industrial innovation.
2	Responsible Consumption and Production	SDG 12	Java full-stack development supports Responsible Consumption and Production (SDG 12) by enabling efficient digital systems that reduce resource waste and optimize processes.
3	Partnerships for the Goals	SDG 17	Java full-stack development supports Partnerships for the Goals (SDG 17) by enabling interoperable, collaborative digital platforms that strengthen cross-organizational partnerships.

12. CRITERIA FOR COURSE OUTCOME ATTAINMENT CALCULATION:

TABLE 8: Threshold and Target Set for Course Outcomes				
Sl. No	C.O. No.	Course Outcomes	Threshold in %	Target in %
1.	CO1	Practice the use of Java for full stack development. (Remember)	65	
2.	CO2	Demonstrate web applications using Java EE.	65	
3.	CO3	Solve simple applications using Java Persistence and Hibernate.	60	
4.	CO4	Apply concepts of Spring to develop a Full Stack application.	60	
5.	CO5	Employ automation tools like Maven, Selenium for Full Stack development.	60	

13. SUMMARY:

	TABLE 9: SUMMARY OF COURSE SCHEDULE			
Sl. No.	Activity	Start date	End date	Total number of Sessions
1.	Overview of the course	07/01/2026	15/01/2026	**04** Lecture [02 Lecture + 02 Practicals]
2.	Module: 01	16/01/2026	30/01/2026	**08** [04 Lecture + 04 Practicals]
3.	Module: 02	31/01/2026	21/02/2026	**12** [06 Lecture + 06 Practicals]
4.	Module:03	23/02/2026	20/03/2026	**12**[06 Lecture + 06 Practical]
5.	Mid Term	10/03/2026	14/03/2026	
6.	Module:04	23/03/2026	13/04/2026	**12** [06 Lecture + 06 Practicals]
7.	Module:05	14/04/2026	05/05/2026	**12** [06 Lecture + 06 Practicals]
8.	Assignment	06/05/2026	06/05/2026	
9.	End Term	07/05/2026	30/05/2026	

CONTACT TIMINGS IN THE CHAMBER FOR DISCUSSION

Students can meet the respective course instructor during the Chamber Consultation Hour to clarify doubts related to the course.

SPECIFIC GUIDELINES TO STUDENTS, IF ANY:

- Attend all classes regularly.
- Bring a scientific calculator to every class.
- Refer to online study materials and watch the suggested videos available on the NPTEL website.

Name and Signature of the course In-Charge

APPROVAL:

This course has been duly verified and approved by the Departmental Academic Committee (DAC).

Name and Signature of the Chairperson - DAC