



SHARDA
UNIVERSITY
Beyond Boundaries



**SHARDA SCHOOL OF
COMPUTING SCIENCE
& ENGINEERING**

Full Stack Development



COURSE

Full Stack Development (NV61106)

VALUE ADDED

COURSE BROCHURE-30 HRS

2026-27

ABOUT SCHOOL

Sharda School of Computing Science & Engineering is an open platform for diverse voices where teaching runs parallel to the real world, and students are groomed to join the global workforce. SSCSE is distinguished as one of the top-ranked engineering schools in India. The students at SSCSE benefit through the professional grooming of renowned faculty and industry experts having experience of tackling pressing engineering problems. Students discover their passion in one of the various offered Engineering majors at the Sharda School of Computing Science & Engineering. A student-centric pedagogy, project-based approach and design-driven curriculum provides students with an inclination for complex problem solving, design, innovation, and a passion for learning.

ABOUT DEPARTMENT

The Department of Computer Science & Application stands as a pioneer in higher education, research, and innovation within key realms of computer science and application. The mission of the department is to foster excellence in the realm of computer science and application through the impartation of higher education and cutting-edge research. The department boasts an accomplished faculty with a stellar academic track record and proficiency in cutting-edge technologies. The faculty members bring diverse specializations to the fore, ensuring the fulfilment of teaching and research needs. The entire faculty of the department is associated with esteemed universities, institutions, and government departments.

The commitment is to install a spirit of ingenuity, innovativeness, and technical competence in our students through rigorous competition and consistent guidance. Additionally, the department caters to regional needs by organizing programs for teaching and research communities. The curriculum is designed to provide a robust theoretical foundation complemented by high-quality teaching and extensive practical training. Beyond the regular curriculum, the department hosts workshops, technical seminars, faculty development programs (FDP), short-term training programs (STTP), and conferences, exposing students to real-world problems aligning with industrial and societal needs.

A testament to the success of the department is the fact that many of the alumni are now thriving in esteemed companies such as IBM, American Express Bank, Wipro, Infosys, Samsung, Microsoft, GlobalLogic, CISCO, and HCL, both in India and abroad. Prominent alumni also consist of entrepreneurs and scholars who have made significant contributions to prestigious academic institutions.

VALUE ADDED COURSE (VAC)

The Value added Education Courses aim to provide additional learner centric graded skill oriented training, with the primary objective of improving the employability skills of students.

PURPOSE OF VALUE ADDED COURSE

VACs are pertinent instructional strategies designed to close knowledge gaps in students and provide them a competitive edge in the job market. The courses' well-defined structure makes these VACs highly effective in enhancing students' employability quotient by developing diverse competencies. They help students lay the creative groundwork for passion projects (such as interactive dashboards, business analytics, or sector-specific visual reports) beyond their core academic curriculum, offering skills that can transform their enthusiasm into career opportunities.

Course Schedule

Week	Topic	Duration Hrs.
1	Web Fundamentals: HTML5 structure, semantic elements, forms and input controls.	2
2	CSS Foundations: box model, selectors, styling, accessibility and cross-browser compatibility.	2
3	Responsive Web Design: Flexbox, CSS Grid, media queries and reusable design patterns.	2
4	Modern UI Development: Tailwind CSS, utility-first design, UI prototyping and AI-assisted design workflows.	2
5	Version Control and Collaboration: Git workflows, branching, merging, rebasing, GitHub pull requests and code reviews.	2
6	JavaScript Fundamentals: data types, operators, control structures, functions, arrays and objects.	2
7	Advanced JavaScript: scope, closures, execution context, ES6+ features and functional programming concepts.	2
8	Browser Architecture and Asynchronous JavaScript: DOM, event loop, call stack, microtasks, macrotasks, Fetch API and async/await.	2
9	JavaScript Performance and Debugging: error handling, debouncing, throttling, memory leaks and browser developer tools.	2
10	React Fundamentals: component-based architecture, JSX, props, state and reusable component design.	2
11	React Hooks and Application Architecture: useState, useEffect, useMemo, useCallback, routing and state management.	2
12	Frontend Performance and Testing: component libraries, code splitting, memoisation, lazy loading, Jest and React Testing Library.	2
13	Backend Development: Node.js architecture, Express.js, middleware, routing and REST API design.	2
14	Database and Application Security: MongoDB, PostgreSQL, schema design, CRUD operations, indexing, JWT.	2
15	Full Stack Integration, System Design and Deployment: frontend-backend integration, Redis, scalability, Docker, CI/CD, logging and monitoring.	2

RESOURCE PERSON

Mr. Aditya Mishra

Mr. Aditya Mishra specializes in Full Stack Development using the MERN Stack, Golang, and System Design. He has more than three years of experience across both the software industry and academia. Having worked on production-grade applications as a Software Engineer and now mentoring aspiring developers, he strongly believes in bridging the gap between theoretical concepts and real-world engineering practices. In his sessions, Mr. Mishra emphasizes hands-on development, clean coding principles, and industry-standard workflows to help students build applications with confidence. His objective throughout this course is to ensure that every learner develops practical skills that are directly applicable to today's software development landscape.

School : SSES Department : Department of Computer Science & Applications Branch : MCA (Core, AIML/CS) & M.Sc. (Core, AIML/CS)		Batch: 2025-2028 Current Academic Year: 2026-27 Semester: III
1. Course Code	NV61106	
2. Course Title	Full Stack Development	
3. Credits	Audit	
4. Contact Hours (L-T-P)	30 Hours	
Course Type	Value added course	
5. Course Objective	To develop the ability to design, implement, and deploy scalable full stack web applications by integrating frontend, backend, and database technologies along with intelligent system, DevOps capabilities. The course emphasizes software engineering principles, system design, testing, security, and production readiness.	
6. Course Outcomes	Upon successful completion of this course, the student will be able to: CO1: Design responsive and accessible user interfaces using modern web technologies. CO2: Develop dynamic client-side applications using structured programming and component-based architecture. CO3: Build secure and scalable backend systems and APIs. CO4: Design and manage relational and non-relational databases efficiently. CO5: Integrate full stack systems with intelligent features and deploy production-ready applications. CO6: Build and deploy AI-powered, production-ready full stack applications.	
7. Course Description	This course provides a comprehensive understanding of full stack web development, covering frontend engineering, backend systems, database management, and deployment. It introduces intelligent system integration within applications and emphasizes performance, security, testing, and scalability. The course follows a project-driven approach aligned with modern industry practices.	
8. Outline syllabus		Duration Hours
Unit 1	Frontend Foundations & Engineering Principles	
A	Web Fundamentals: HTML5 semantics, forms, accessibility (ARIA basics), CSS fundamentals, box model, responsive design, Cross-browser compatibility	CO1
B	Advanced Layout & Styling Systems: Flexbox, CSS Grid, Design systems & reusable UI patterns, Responsive design using media queries, Tailwind CSS and utility-first design, UI prototyping and AI-assisted design workflows	CO1
C	Version Control & Collaboration: Git workflows (branching, merging, rebasing), GitHub collaboration (PRs, code reviews), Code quality practices	CO1
Unit 2	JavaScript, Browser Architecture & Performance	
A	Core JavaScript: Data types, operators, control structures, Functions, scope, closures, Arrays and objects, Execution context, scope, closures, ES6+ features, Functional vs imperative patterns	CO2,CO3
B	Browser & Async Behavior: Event loop, call stack, microtasks vs macrotasks, DOM manipulation & virtual DOM concept, Data fetching and processing, Fetch API, async/await, error handling	CO2,CO3
C	Performance & Optimization: Debouncing, throttling Memory leaks in JS, Debugging using modern tools	CO2,CO3
Unit 3	Frontend Architecture and Application Design (React Ecosystem)	
A	Component-Based Architecture: Principles of modular UI development, State and data flow management, Reusable component design React Core: Components, JSX, props, state, Hooks (useState, useEffect, useMemo, useCallback)	CO4
B	Scalable Frontend Architecture: Routing (React Router), State management (Redux Toolkit / Zustand) Component design patterns	CO4
C	UI Systems & Performance: Design systems with component libraries, Code splitting, memoization & lazy loading, Frontend testing (Jest, React Testing Library)	CO4
Unit 4	Backend Systems, Databases & Security	
A	Backend Engineering: Server-side architecture, Request-response lifecycle, Node.js architecture, Express.js, middleware, routing, REST API design principles	CO5
B	Database Systems: MongoDB (NoSQL design- document-based), PostgreSQL (relational design), Indexing, query, schema design, normalization, optimization, Data modeling trade-offs, CRUD operations	CO5
C	Authentication, Security & Validation: Authentication and authorization mechanisms, Common vulnerabilities and mitigation strategies, JWT authentication, Input validation and data protection, sanitization, OWASP Top 10 (practical understanding), API rate limiting	CO5
Unit 5	System Design, Full Stack Integration, DevOps & Scalability	
A	System Design and Integration: Connecting frontend and backend systems, API consumption and data flow, Application architecture patterns, Monolith vs microservices, Scalability, load balancing, Caching (Redis basics), CAP theorem (practical view)	CO6
B	DevOps & CI/CD: Application Deployment concepts, Docker fundamentals, CI/CD pipelines (GitHub Actions), Environment management and configuration.	CO6
C	Observability & Reliability: Logging & monitoring, Error tracking, Performance metrics (latency, throughput)	CO6
Mode of Examination	Assignments/Quizzes/Presentation/Group discussion	
Text book/s*	1. Full Stack Web Development with JavaScript, Colin Ihrig, Apress 2. Web Development and Design Foundations with HTML5, Terry Felke-Morris, Pearson	
Other References	1. Eloquent JavaScript, Marijn Haverbeke, No Starch Press 2. You Don't Know JS (Book Series), Kyle Simpson, O'Reilly 3. Learning Web Design, Jennifer Niederst Robbins, O'Reilly 4. Designing Data-Intensive Applications, Martin Kleppmann, O'Reilly	