**Software Requirements Specification (SRS) Template**

**Project:** Student Attendance Management System  
**Version:** 1.0  
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**Status:** Draft

**Revision history**

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| 1.0 | 03-09-2025 | Lakshya Sukruthi N,  N V Manya, Navyashree J | Initial SRS for Student Attendance Management System |  |

**Approvalss**

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| **Role** | **Name** | **Signature / Email** | **Date** |
| Course Coordinator |  |  |  |

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**1. Introduction**

**1.1 Purpose**

This document is a Software Requirements Specification (SRS) for a Student Attendance Management System. It defines functional and non-functional requirements, interfaces, and verification criteria for automating attendance tracking in educational institutions.

**1.2 Scope**

Covers student attendance recording through multiple methods (manual entry, QR codes, biometric), attendance report generation, student and faculty management, integration with existing student information systems, and administrative functions. Excludes payroll processing and grade management beyond attendance correlation.

**1.3 Audience**

Developers, QA Engineers, System Integrators, Educational Administrators, Faculty Members, and Assessment Evaluators.

**1.4 Definitions**

List of acronyms: SMS, QR, RFID, API, UI, DB, CSV, PDF, LDAP, SSO.

**2. Overall description**

**2.1 Product perspective**

The Student Attendance Management System is a web-based application that integrates with existing student information systems. It includes a central database, web interface for different user roles, mobile application for attendance marking, and reporting module for analytics and compliance.

**2.2 Major product functions (detailed)**

* User authentication and role-based access control
* Student registration and profile management
* Course and class schedule management
* Multiple attendance marking methods (manual, QR code, proximity card)
* Real-time attendance tracking and validation
* Automated absence notifications to parents/guardians
* Comprehensive reporting and analytics
* Data export capabilities (CSV, PDF)
* Integration with existing student information systems
* Attendance policy configuration and enforcement

**2.3 User roles and characteristics (expanded)**

* **Students**: Basic technology literacy, expect quick and easy attendance marking
* **Faculty/Teachers**: Moderate technology skills, need efficient class management tools
* **Administrators**: Advanced system knowledge, require comprehensive reporting and system configuration capabilities
* **Parents/Guardians**: Basic technology skills, need access to their child's attendance records
* **IT Support**: Technical expertise, need system maintenance and troubleshooting tools

**2.4 Operating environment**

Web-based system compatible with modern browsers (Chrome, Firefox, Safari, Edge), mobile applications for iOS and Android, MySQL/PostgreSQL database, cloud hosting with scalability options, integration capabilities with LDAP/Active Directory.

**2.5 Constraints**

FERPA compliance for student privacy, data retention policies as per institutional requirements, existing infrastructure compatibility, budget limitations for hardware (QR scanners, proximity card readers), internet connectivity requirements for real-time synchronization.

**3. External interface requirements**

**3.1 User interfaces**

Primary UI: Responsive web interface optimized for desktop and tablet use. Mobile app with simplified interface for attendance marking. Dashboard views customized by user role with clear navigation and accessibility features including keyboard navigation and screen reader compatibility.

**3.2 Hardware interfaces**

* QR code scanners/mobile cameras
* RFID/proximity card readers (optional)
* Barcode scanners for student ID cards
* Printers for attendance reports
* Mobile devices (iOS/Android)

**3.3 Software interfaces**

* Student Information System API (JSON/XML over HTTPS)
* Email service integration (SMTP) for notifications
* SMS gateway API for text notifications
* LDAP/Active Directory for user authentication
* Export interfaces for Excel, CSV, and PDF generation
* Calendar system integration for schedule synchronization

**3.4 Communications**

* HTTPS encryption for all web communications
* RESTful API architecture
* Real-time notifications via WebSocket connections
* Offline capability with data synchronization when connectivity restored
* API rate limiting and authentication tokens

**4. System features (detailed)**

Each requirement below includes acceptance criteria and a reference test case. IDs follow SAMS-F-###.

**4.1 User Authentication and Authorization**

Description: Secure login system with role-based access control supporting multiple authentication methods.

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| **Req ID** | **Requirement** | **Type** | **Priority** | **Source/Stakeholder** | **Acceptance criteria / Test case ref** | **Comments / Dependencies** |
| SAMS-F-001 | The system shall authenticate users via username/password, LDAP, or SSO integration | Functional | High | IT Security | AC-SAMS-F-001: Successful login redirects to appropriate dashboard. Test: TC-Auth-01 | Requires LDAP server access |
| SAMS-F-002 | The system shall implement role-based access control with distinct permissions for students, faculty, and administrators | Functional | High | Administration | AC-SAMS-F-002: Users can only access features permitted by their role. Test: TC-Auth-02 | Database role configuration |
| SAMS-F-003 | The system shall automatically log out inactive users after 30 minutes | Functional | Medium | Security | AC-SAMS-F-003: Session expires and redirects to login after 30 min inactivity. Test: TC-Auth-03 | Session management required |

**4.2 Student Management**

Description: Complete student profile management with course enrollment tracking.

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| **Req ID** | **Requirement** | **Type** | **Priority** | **Source/Stakeholder** | **Acceptance criteria / Test case ref** | **Comments / Dependencies** |
| SAMS-F-010 | The system shall allow administrators to add, edit, and deactivate student records | Functional | High | Administration | AC-SAMS-F-010: CRUD operations successful with audit trail. Test: TC-Student-01 | Database integration |
| SAMS-F-011 | The system shall support bulk student import via CSV file upload | Functional | High | Administration | AC-SAMS-F-011: CSV processed with validation errors reported. Test: TC-Student-02 | File processing capability |
| SAMS-F-012 | The system shall maintain student enrollment history across semesters | Functional | Medium | Academic Affairs | AC-SAMS-F-012: Historical enrollment data accessible and accurate. Test: TC-Student-03 | Data archiving strategy |

**4.3 Attendance Recording**

Description: Multiple methods for recording student attendance with real-time validation.

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| **Req ID** | **Requirement** | **Type** | **Priority** | **Source/Stakeholder** | **Acceptance criteria / Test case ref** | **Comments / Dependencies** |
| SAMS-F-020 | The system shall allow faculty to mark attendance manually through a class roster interface | Functional | High | Faculty | AC-SAMS-F-020: Attendance marked and saved with timestamp. Test: TC-Attend-01 | Class schedule integration |
| SAMS-F-021 | The system shall support QR code-based attendance marking by students | Functional | High | Students/Faculty | AC-SAMS-F-021: QR scan records attendance within time window. Test: TC-Attend-02 | QR code generation/validation |
| SAMS-F-022 | The system shall validate attendance timing against class schedules | Functional | High | Academic Policy | AC-SAMS-F-022: Attendance rejected outside class time plus buffer. Test: TC-Attend-03 | Schedule database required |
| SAMS-F-023 | The system shall allow modification of attendance records with audit trail | Functional | Medium | Faculty | AC-SAMS-F-023: Changes logged with user ID and timestamp. Test: TC-Attend-04 | Audit logging system |
| SAMS-F-024 | The system shall support proximity card-based attendance marking | Functional | Low | Technology | AC-SAMS-F-024: Card tap records attendance for enrolled student. Test: TC-Attend-05 | RFID reader integration |

**4.4 Notification System**

Description: Automated notifications to stakeholders about attendance events and status.

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| **Req ID** | **Requirement** | **Type** | **Priority** | **Source/Stakeholder** | **Acceptance criteria / Test case ref** | **Comments / Dependencies** |
| SAMS-F-030 | The system shall send automated email notifications to parents when student absence exceeds configured threshold | Functional | High | Parents/Administration | AC-SAMS-F-030: Email sent within 1 hour of threshold breach. Test: TC-Notify-01 | SMTP server integration |
| SAMS-F-031 | The system shall send SMS alerts for critical attendance issues | Functional | Medium | Parents | AC-SAMS-F-031: SMS delivered via gateway API. Test: TC-Notify-02 | SMS gateway service |
| SAMS-F-032 | The system shall allow users to configure their notification preferences | Functional | Medium | All Users | AC-SAMS-F-032: Preferences saved and respected. Test: TC-Notify-03 | User preference storage |

**4.5 Reporting and Analytics**

Description: Comprehensive reporting system with various export options and analytics.

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| **Req ID** | **Requirement** | **Type** | **Priority** | **Source/Stakeholder** | **Acceptance criteria / Test case ref** | **Comments / Dependencies** |
| SAMS-F-040 | The system shall generate attendance reports by student, class, and time period | Functional | High | Faculty/Administration | AC-SAMS-F-040: Reports display accurate data with filtering options. Test: TC-Report-01 | Reporting engine |
| SAMS-F-041 | The system shall export reports in CSV, Excel, and PDF formats | Functional | High | Administration | AC-SAMS-F-041: Files generated and downloadable in specified formats. Test: TC-Report-02 | Export libraries |
| SAMS-F-042 | The system shall provide attendance analytics dashboard with charts and trends | Functional | Medium | Administration | AC-SAMS-F-042: Dashboard displays visual analytics with accurate data. Test: TC-Report-03 | Charting library integration |
| SAMS-F-043 | The system shall calculate and display attendance percentages with policy compliance status | Functional | High | Academic Affairs | AC-SAMS-F-043: Percentages accurate and policy status correctly indicated. Test: TC-Report-04 | Attendance policy engine |

**5. Non-functional requirements (detailed)**

NFRs below are measurable and tied to test plans. IDs SAMS-NF-###.

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| **Req ID** | **Requirement** | **Category** | **Priority** | **Acceptance criteria / Measurement** |
| SAMS-NF-001 | System shall support up to 10,000 concurrent users with response time ≤ 3 seconds for 95% of requests | Performance | High | Load testing shows 95th percentile ≤ 3s. Test: TC-Perf-01 |
| SAMS-NF-002 | System shall maintain 99.5% uptime during academic hours (8 AM - 6 PM) | Reliability | High | Monthly uptime reports show ≥99.5% availability. Test: Operations monitoring |
| SAMS-NF-003 | System shall comply with FERPA requirements for student data privacy | Security/Compliance | High | FERPA compliance audit checklist pass. Test: TC-Sec-01 |
| SAMS-NF-004 | System shall backup all data daily with ability to restore within 4 hours | Data Protection | High | Backup and restore procedures tested monthly. Test: TC-Backup-01 |
| SAMS-NF-005 | Web interface shall be responsive and usable on devices with minimum 1024x768 resolution | Usability | Medium | UI testing on various screen sizes passes. Test: TC-UI-01 |

**5.1 Security**

**5.1.1 Security Objectives**

1. **Data Confidentiality**: Ensure student attendance data is accessible only to authorized personnel
2. **System Integrity**: Prevent unauthorized modification of attendance records and system configuration

**5.1.2 Security Requirements**

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| --- | --- | --- | --- | --- |
| **Req ID** | **Requirement (shall...)** | **Type** | **Priority** | **Acceptance criteria / Test case ref** |
| SAMS-SR-001 | All data transmission shall use HTTPS encryption (TLS 1.2+) | Security | High | Network traffic analysis shows only encrypted connections. Test: TC-Sec-02 |
| SAMS-SR-002 | User passwords shall meet complexity requirements and be hashed using bcrypt | Security | High | Password policy enforced and hash verification passes. Test: TC-Sec-03 |
| SAMS-SR-003 | System shall log all user actions with timestamps for audit trail | Security | High | Audit logs capture all CRUD operations with user identification. Test: TC-Sec-04 |
| SAMS-SR-004 | Database connections shall use encrypted connections with credential rotation | Security | Medium | Database traffic encrypted and credentials updated quarterly. Test: TC-Sec-05 |
| SAMS-SR-005 | System shall implement input validation to prevent SQL injection and XSS attacks | Security | High | Security scanning tools show no vulnerabilities. Test: TC-Sec-06 |

**6. Quality attributes & Acceptance tests**

* **Exit criteria for acceptance**: All high-priority functional requirements implemented and verified, no critical NFR failures, security audit passed, and RTM shows all test cases passed with ≥90% success rate.
* **Acceptance test suites**: Authentication, Student Management, Attendance Recording, Notifications, Reporting, Performance, Security, and Usability tests.
* **Performance benchmarks**: System must handle typical daily load of 5,000 students marking attendance within 15-minute peak periods.
* **Data integrity requirements**: All attendance records must have complete audit trails with no data loss tolerance.

**7. System models and diagrams**

**7.1 UML Use-Case Diagrams**

**A diagram of a company

AI-generated content may be incorrect.**

**A diagram of a student's management system

AI-generated content may be incorrect.**

**Technology Stack Recommendations**

|  |  |  |
| --- | --- | --- |
| **Component** | **Technology** | **Justification** |
| Frontend Framework | React.js/Vue.js | Modern, responsive UI with component-based architecture |
| Backend Framework | Node.js/Django/Spring Boot | Scalable server-side development with RESTful API support |
| Database | MySQL/PostgreSQL | Relational database suitable for structured attendance data |
| Authentication | JWT/OAuth 2.0 | Secure token-based authentication with SSO support |
| Mobile App | React Native/Flutter | Cross-platform mobile development for attendance marking |
| Web Server | Nginx/Apache | High-performance web server with load balancing capabilities |
| Caching | Redis | Fast session management and frequently accessed data caching |
| Notification Services | Firebase/Twilio | Email and SMS notification delivery services |

**Implementation Guidelines**

**Phase 1: Core Development (Weeks 1-4)**

* User authentication and role management
* Basic student and course management
* Manual attendance recording interface
* Database design and setup

**Phase 2: Advanced Features (Weeks 5-8)**

* QR code attendance system
* Notification system implementation
* Basic reporting functionality
* Parent portal development

**Phase 3: Enhancement and Testing (Weeks 9-12)**

* Advanced analytics and reporting
* Mobile app development
* Integration with external systems
* Performance optimization and security hardening

**Phase 4: Deployment and Monitoring (Weeks 13-14)**

* Production deployment setup
* System monitoring and alerting
* User training and documentation
* Final acceptance testing

**8. Requirements Traceability Matrix (RTM)**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Req ID** | **Requirement short** | **Section ref / Design Spec** | **Module** | **Test case(s)** | **Status (N/P/A)** | **Comments** |
| SAMS-F-001 | User authentication | 4.1 / DS-Auth-01 | AuthModule | TC-Auth-01 | N |  |
| SAMS-F-010 | Student CRUD | 4.2 / DS-Student-01 | StudentModule | TC-Student-01 | N |  |
| SAMS-F-020 | Manual attendance | 4.3 / DS-Attend-01 | AttendanceModule | TC-Attend-01 | N |  |
| SAMS-F-021 | QR attendance | 4.3 / DS-Attend-02 | AttendanceModule | TC-Attend-02 | N |  |
| SAMS-F-030 | Email notifications | 4.4 / DS-Notify-01 | NotificationModule | TC-Notify-01 | N |  |
| SAMS-F-040 | Attendance reports | 4.5 / DS-Report-01 | ReportModule | TC-Report-01 | N |  |
| SAMS-NF-001 | Performance target | 5 / DS-Perf-01 | WebAPI / Database | TC-Perf-01 | N |  |
| SAMS-SR-001 | HTTPS encryption | 5.1.2 / DS-Sec-01 | NetworkModule | TC-Sec-02 | N |  |