

Complete Learning Management System (LMS) Specification

System Overview

This is a comprehensive LMS for managing tutors, students, classes, and administrative functions across three educational departments: K12, TT (Teacher Training), and Upskill programs.

User Roles & Access Levels

1. Super Admin

- **Full system access** - can manage all features
- **Department management** - can assign specific access rights to coordinators
- **Global oversight** - monitors all operations across departments

2. Coordinators

- **Department-specific access** - only features assigned by Super Admin
- **Operational management** - day-to-day operations within their department
- **Limited administrative rights** - cannot access system settings

3. Tutors

- **Personal dashboard** - view their classes, students, salary
- **Class management** - conduct classes, mark attendance, upload videos
- **Profile management** - update personal information, download documents

SUPER ADMIN FEATURES

Authentication System

Login Process

- **Username/Email + Password authentication**
- **Session management** with timeout
- **Role-based redirection** after login

Password Management

- **Forget Password:** Email-based password reset link
- **Reset Password:** Secure token-based password reset
- **Auto-generated passwords** for new users with email notification

Dashboard

Real-time Analytics Display:

- Total active users count (Admins, Coordinators, Tutors, Students)
- Today's scheduled classes count
- Attendance statistics (present/absent/late)
- Revenue metrics (fees collected, pending payments)
- Interactive charts showing:
 - Monthly enrollment trends
 - Department-wise performance
 - Tutor utilization rates
 - Student satisfaction scores

Department Management

Department Setup

- **Create departments:** K12, TT, Upskill (expandable)
- **Access control matrix** for each department:

Available permissions per department:

- Users management
- Tutor management (Add/Edit/View/Deactivate)
- Student management (Add/Edit/View/Deactivate)
- Class allocation
- Timetable management
- Attendance reports
- Salary management
- Fee management
- Demo scheduling
- Escalation handling
- Notice distribution
- Quality checking
- Email communication
- Report generation
- Profile management
- Settings access

Coordinator Access Assignment

- **Granular permission control** - select specific features per coordinator
- **Department isolation** - coordinators only see their department data
- **Permission inheritance** - default permissions per department type

User Management

User Listing & Operations

- **Comprehensive user table** with columns:
 - User ID, Name, Email, Phone Number, Role, Department, Status, Last Login, Join Date
- **Action buttons** per user:
 - View Details, Edit Profile, Deactivate/Activate, Reset Password, delete (only of the super admin)
- **Filtering options:** By role, department, status, join date range
- **Search functionality:** Name, email, user ID

- **Bulk operations:** Mass email, bulk deactivation

Add New Users (Admins & Coordinators)

Required Information:

- **Basic Details:** Full name, username, email, phone number
- **Authentication:** Auto-generated password (with manual override option)
- **Assignment:** Department selection, role assignment
- **Profile:** Photo upload (optional), joining date, working hours (from-to time)
- **Additional:** Address, emergency contact

Post-Creation Actions:

- **Welcome email** with login credentials
- **Onboarding email sequence** with system guide
- **Department-specific training materials**

Tutor Management

Tutor Categories

Three distinct tutor types with different requirements:

1. **K12 Tutors:** School curriculum subjects
2. **TT Tutors:** Teacher training programs
3. **Upskill Tutors:** Professional development courses

Add Tutor Form (All fields mandatory)

Personal Information:

- Username (unique identifier)
- Full name, contact number, email ID
- Date of birth, complete address, state, pin code

Professional Details:

- **Qualification:** Dropdown with "Add more" option for custom entries

- **Experience:** Years and relevant background (text area)
- **Subjects:** Multi-select with "Add new subject" functionality
- **Grades:** Multi-select grade levels they can teach
- **Board:** Education boards they're familiar with "Add Button"

Availability Schedule:

Weekly availability matrix:

Monday: [Start Time] to [End Time]
 Tuesday: [Start Time] to [End Time]
 Wednesday: [Start Time] to [End Time]
 Thursday: [Start Time] to [End Time]
 Friday: [Start Time] to [End Time]
 Saturday: [Start Time] to [End Time]
 Sunday: [Start Time] to [End Time]

- Time slots in 30-minute intervals
- Multiple time slots per day allowed
- Recurring weekly pattern
- Holiday/leave marking system

Compensation Structure:

- **Salary Type:** Fixed monthly OR hourly rate
- **Fixed Monthly:** Amount per month
- **Hourly Rate:** Amount per hour
- **Incentive structure:** Performance bonuses, completion bonuses

Document Uploads (Required):

- Aadhaar card (government ID)
- PAN card (tax ID)
- Resume/CV
- Degree certificates
- Offer letter
- Experience letter (if applicable)

Video Submissions:

- **Demo video:** Sample teaching session (max 10 minutes)
- **Interview video:** Introduction and teaching philosophy (max 5 minutes)

Banking Information:

- Account holder name
- Bank name and branch
- Account number
- IFSC code
- Bank verification document

Post-Registration Process:

- **Email notification** with login credentials
- **Profile verification** by admin
- **Document verification** process
- **Demo class scheduling** for evaluation

Tutor List Management

- **Comprehensive view** with search and filter options
- **Quick actions:** View profile, Edit details, Activate/Deactivate, delete (only of the super admin)
- **Status indicators:** Active, Inactive, Under Review, Verified
- **Performance metrics:** Classes taught, student ratings, punctuality score

Student Management

Add Student Form

Student Information:

- Full name, grade level, educational board
- Academic year, course start date
- School name, complete address, state, pin code
- Date of birth, student email ID

Parent/Guardian Details:

Father's Information:

- Name, contact number, email
- Profession, workplace

Mother's Information:

- Name, contact number, email
- Profession, workplace

Academic Profile:

- **Siblings:** Number and their educational status
- **Hobbies:** Multiple selection with custom entry option
- **Learning styles:** Visual, Auditory, Kinesthetic, Reading/Writing, "Add Button"
- **Learning patterns:** Fast learner, Needs repetition, Self-paced, "Add Button"
- **Favorite subjects:** Link with available tutors
- **Difficult subjects:** Areas needing extra attention
- **Parent feedback:** Previous tutoring experience, learning challenges

Availability Schedule:

Same format as tutor availability:

Weekly time slots when student is available for classes

- Considers school hours
- Includes weekend availability
- Holiday preferences

Document Uploads:

- Previous year's mark sheet
- Aadhaar card
- School ID (if available)

Admission Details:

- **Relationship Manager (RM):** Assigned sales person
- **Classes enrolled:** Subject-wise enrollment
- **Board preference:** Must match with tutor qualifications
- **Class hours:** Total hours per week
- **Number of classes:** Frequency per week

- **Course duration:** Expected completion timeframe

Fee Structure:

- **Total fee:** Complete course fee
- **Amount paid:** Initial payment received
- **Balance amount:** Remaining fee
- **Payment modes:** Online, Bank transfer, Cash, Cheque, UPI
- **Payment schedule:** Monthly, Quarterly, One-time
- **Installment plan:** If applicable

Student List Management

- **Advanced filtering:** By grade, board, subject, tutor, fee status
- **Academic tracking:** Progress reports, attendance summary
- **Fee status:** Paid, Pending, Overdue with color coding
- **Parent communication:** Email/SMS integration

Class Management

Class Allocation System

Class Types:

1. **One-on-One Classes:** Individual student with one tutor
2. **Group Classes:** Multiple students with one tutor

One-on-One Class Setup:

- **Student selection:** Choose from enrolled students
- **Subject selection:** Based on student's enrolled subjects
- **Tutor matching:** filtering based on:
 - Subject expertise
 - Grade level compatibility
 - Board knowledge
 - Available time slots
 - Student's preferred learning style
- **Schedule creation:**
 - Weekly recurring schedule

- Specific time slots
- Duration per class (time can chose options)
- Holiday handling

Group Class Setup:

- **Tutor selection:** Choose tutor first
- **Subject definition:** What will be taught
- **Student allocation:** Add multiple students based on:
 - Same grade level
 - Same subject requirement
 - Compatible time availability
 - Similar learning pace
- **Group size limits:** Maximum students per group (configurable)

Online Class Integration:

- **Platform link upload:** Zoom, Google Meet, Microsoft Teams, etc.
- **Join reminders:** 15 minutes and 5 minutes before class
- **Backup platform:** Alternative link if primary fails

Scheduling Intelligence:

- **Conflict detection:** Prevents double-booking of tutors/students
- **Time zone handling:** If students/tutors in different zones
- **Buffer time:** Minimum gap between consecutive classes
- **Make-up class scheduling:** For missed/cancelled classes

Timetable Management

Calendar View Features

- **Multiple view modes:** Daily, Weekly, Monthly
- **Color coding:** By subject, tutor, student, class type
- **Interactive interface:** Drag-and-drop rescheduling
- **Real-time updates:** Live status of ongoing classes

Daily Operations

- **Today's schedule:** Complete day view for coordinators
- **Class status tracking:** Scheduled, Ongoing, Completed, Cancelled, Rescheduled
- **Emergency changes:** Same-day rescheduling with auto-notifications
- **Substitute tutor:** Temporary tutor assignment for absent tutors
- **Temporary classes:** Add extra classes on demand

Schedule Modifications

- **Bulk rescheduling:** Move multiple classes due to holidays
- **Recurring changes:** Permanent schedule modifications
- **Leave management:** Tutor/student leave with class rescheduling
- **Holiday calendar:** National/regional holidays with automatic adjustments

Attendance Management

Attendance Settings

Punctuality Rules:

- **Late arrival:** Define "late" threshold (e.g., 5 minutes)
- **Late penalty:** Deduction amount for monthly salary tutors
- **Hourly rate impact:** Late arrival affects hourly payment calculation

Leave Management:

- **Maximum allowed leaves:** Per month for monthly salary tutors
- **Leave penalty:** Deduction per unauthorized leave
- **Leave approval:** Process for planned leaves
- **Emergency leave:** Same-day leave notification system

Attendance Recording:

- **Tutor self-marking:** Tutors mark their own attendance
- **Student attendance:** Tutors mark student attendance
- **Class completion:** Link attendance with actual class completion

Attendance Reports

Comprehensive Reporting:

- **Individual reports:** Per tutor/student attendance history
- **Class-wise reports:** Attendance for specific classes
- **Monthly summaries:** Aggregate attendance data
- **Punctuality analysis:** Late arrival patterns and trends
- **Absence reasons:** Categorized absence tracking

Export Options:

- **Excel/CSV export:** For payroll and analysis
- **PDF reports:** Formatted reports for review
- **Email automation:** Weekly/monthly reports to stakeholders

Financial Management

Tutor Salary Management

Salary Calculation Types:

Monthly Fixed Salary:

- Base salary amount
- Attendance-based calculations
- Late arrival deductions
- Leave penalty deductions
- Performance bonuses
- Overtime calculations

Hourly Rate Payment:

- Hours taught tracking
- Rate per hour
- Late arrival time deductions
- Bonus hours payment
- Holiday rate multipliers

Automated Calculations:

- **Monthly processing:** Automated salary generation
- **Attendance integration:** Direct link with attendance data
- **Penalty applications:** Automatic deduction calculations
- **Bonus calculations:** Performance-based additions
- **Tax calculations:** Basic tax deductions if applicable

Payment Processing:

- **Salary slips:** Detailed breakdown generation
- **Excel export:** For accounting and bank transfer
- **Edit capabilities:** Coordinator override for special cases
- **Payment history:** Complete salary payment tracking
- **Advance payments:** Salary advance management

Student Fee Management

Fee Structure Setup:

- **Course fees:** Total fee per subject/course
- **Payment plans:** Monthly, quarterly, one-time options
- **Installment scheduling:** Custom payment schedules
- **Discount management:** Sibling discounts, early payment discounts

Payment Tracking:

- **Payment history:** Complete payment timeline
- **Balance calculations:** Automatic remaining amount calculation
- **Payment reminders:** Automated email/SMS for due payments
- **Receipt generation:** Digital receipts for payments

Loan/EMI Management:

- **Payment plans:** Convert fees into EMI
- **Interest calculations:** If applicable
- **EMI reminders:** Monthly payment notifications
- **Default management:** Handling missed EMI payments

Demo Class Management

Demo Scheduling

Same as regular classes but with key differences:

- **Separate timetable:** Dedicated demo class calendar
- **One-on-one only:** Demo classes are individual sessions
- **Tutor availability:** Check tutor's demo slot availability
- **Student evaluation:** Post-demo assessment forms

Demo-Specific Features:

- **Conversion tracking:** Demo to enrollment conversion rates
- **Feedback collection:** Student/parent feedback post-demo
- **Follow-up scheduling:** Automatic follow-up reminders
- **Tutor performance:** Demo class success rates per tutor

Escalation Management

Issue Tracking System

Escalation Categories:

- Technical issues (platform problems)
- Academic concerns (teaching quality)
- Payment disputes
- Scheduling conflicts
- Behavioral issues

Escalation Workflow:

Issue Creation → Assignment → Investigation → Resolution → Closure

Priority Levels:

- **High:** Immediate attention required (< 2 hours)
- **Medium:** Important but not urgent (< 24 hours)

- **Low:** General concerns (< 72 hours)

Assignment Rules:

- **Auto-assignment:** Based on issue type and department
- **Manual assignment:** Admin assigns specific person
- **Escalation chain:** Automatic escalation if not resolved in time

Notification System:

- **Email alerts:** To assigned person and admin
- **SMS notifications:** For high priority issues
- **Real-time updates:** Status change notifications
- **Resolution confirmations:** Closure notifications to all parties

Communication System

Notice Management

Notice Distribution:

- **Target audience:** All users, specific departments, individual users
- **Notice types:** General announcements, policy updates, emergency notices
- **File attachments:** Support documents, images, PDFs
- **Delivery confirmation:** Read receipts and acknowledgments

Notice Categories:

- **Academic notices:** Curriculum updates, exam schedules
- **Administrative notices:** Policy changes, system updates
- **Emergency notices:** Urgent communications
- **Celebration notices:** Achievements, events

Email System

Internal Email Portal:

- **Compose emails:** Rich text editor with formatting
- **Recipient selection:** Individual, groups, departments, roles

- **Template library:** Pre-designed email templates
- **Scheduled sending:** Send emails at specific times
- **Delivery tracking:** Email open rates and click tracking

Quality Assurance

Video Quality Checking

Video Upload Requirements:

- **Mandatory uploads:** Tutors must upload class videos
- **Upload deadlines:** Within 2 hours of class completion
- **File formats:** MP4, AVI, MOV (10 GB max)
- **Quality standards:** good resolution and audio quality

Quality Review Process:

- **Automated checking:** Basic quality parameters (duration, size, format)
- **Manual review:** Content quality, teaching effectiveness
- **Feedback system:** Quality improvement suggestions
- **Rating system:** Video quality scoring (1-5 stars)

Compliance Monitoring:

- **Missing video alerts:** Automatic reminders after 1 hour
- **Coordinator escalation:** Notify coordinators for repeated delays
- **Performance impact:** Quality scores affect tutor ratings
- **Improvement plans:** Remedial training for low-quality videos

Reporting System

Comprehensive Reports

Financial Reports:

- Monthly revenue analysis
- Tutor salary summaries
- Student fee collection reports
- Department-wise profitability

- Payment default analysis

Academic Reports:

- Class completion rates
- Student progress tracking
- Tutor performance metrics
- Subject-wise analysis
- Attendance trends

Operational Reports:

- System usage statistics
- User activity reports
- Issue resolution reports
- Quality assessment reports
- Growth analysis reports

Export Capabilities:

- **Multiple formats:** PDF, Excel, CSV
- **Scheduled reports:** Automated weekly/monthly reports
- **Custom date ranges:** Flexible reporting periods
- **Drill-down capabilities:** Detailed analysis options

System Configuration

Profile Management

- **Super admin profile:** Personal information updates
- **Password changes:** Secure password update process
- **Profile picture:** Image upload and management
- **Contact information:** Phone, email updates
- **Notification preferences:** Email/SMS preferences

System Settings

LMS Configuration:

- **Time zone settings:** Global time zone configuration
- **Academic calendar:** Holiday calendars, term dates
- **Notification settings:** System-wide notification preferences
- **File upload limits:** Maximum file sizes for uploads
- **Session timeouts:** User session management
- **Backup schedules:** Automated data backup configuration

TUTOR FEATURES

Tutor Dashboard

Overview Display:

- **Today's classes:** Complete schedule with timings
- **This week's earnings:** Projected salary/earnings
- **Class statistics:** Total classes taught, upcoming classes
- **Performance metrics:** Student ratings, punctuality score
- **Quick links:** Most used features access

Visual Elements:

- **Calendar widget:** Monthly view with class indicators
- **Earnings chart:** Weekly/monthly earnings trend
- **Student progress:** Overview of student performance
- **Announcements:** Important notices from administration

Class Management

My Classes

Complete Class Overview:

- **All assigned classes:** Past, present, and future classes
- **Class details:** Subject, student name, timing, duration
- **Class status:** Scheduled, Completed, Cancelled, Rescheduled
- **Class materials:** Uploaded resources and notes

Class Operations:

- **View class details:** Student information, subject syllabus
- **Cancel classes:** With reason selection and auto-notifications
- **Reschedule requests:** Propose new timings with approval workflow
- **Class notes:** Add notes about each class session

Today's Classes

Daily Focus View:

- **Today's schedule only:** Current day's classes with countdown timers
- **Join class:** Direct links to video call platforms
- **Pre-class preparation:** Student notes, previous class summary
- **Real-time status:** Upcoming, ongoing, completed status

Attendance Management:

- **Self-attendance:** Tutors mark their own attendance
 - **Class start time:** Actual vs scheduled start time
 - **Class end time:** Actual vs scheduled end time
 - **Punctuality tracking:** Late arrival automatic detection
- **Student attendance:** Mark each student's attendance
 - **Present/Absent:** Simple marking system
 - **Late arrival:** If student joins late
 - **Early departure:** If student leaves early
 - **Participation quality:** Optional engagement rating

Class Completion Process:

1. Join class meeting → 2. Mark self-attendance → 3. Conduct class →
4. Mark student attendance → 5. End class → 6. Upload class video →
7. Write class feedback → 8. Submit completion report

Student Management

My Students

Student Information Access:

- **Basic details:** Name, grade, contact information
- **Academic profile:** Subjects enrolled, learning preferences
- **Progress tracking:** Performance over time
- **Parent feedback:** Comments from parents about student progress
- **Attendance history:** Student's attendance in tutor's classes

Limited Information Policy:

- **Privacy protection:** Only essential academic information
- **No financial details:** Fee information not accessible to tutors
- **Contact restrictions:** Formal communication channels only

Performance Tracking

Attendance Reports

Personal Attendance:

- **Monthly attendance:** Complete attendance history
- **Punctuality analysis:** Late arrival frequency and patterns
- **Leave tracking:** Planned and unplanned absences
- **Compensation impact:** How attendance affects earnings

Class-wise Reports:

- **Subject-wise attendance:** Attendance per subject taught
- **Student-wise tracking:** Individual student attendance in tutor's classes
- **Trend analysis:** Improving or declining attendance patterns

Salary Information

Earnings Dashboard:

- **Current month:** Projected earnings based on classes taught
- **Previous months:** Historical salary information
- **Breakdown:** Detailed calculation showing:
 - Base salary/hourly rate
 - Classes taught
 - Bonus payments
 - Deductions (late penalties, leaves)
 - Final amount

Payment History:

- **Salary slips:** Downloadable detailed salary slips
- **Payment dates:** When salaries were processed
- **Tax information:** If applicable

Issue Management

My Escalations

Assigned Issues:

- **Real-time updates:** Current status of assigned escalations
- **Issue details:** Complete problem description and context
- **Action required:** Specific steps tutor needs to take
- **Timeline:** Deadline for resolution
- **Communication:** Message thread with coordinators

Resolution Process:

- **Status updates:** Progress reporting on issue resolution
- **Evidence upload:** Screenshots, documents supporting resolution
- **Communication log:** All interactions regarding the issue

Demo Classes

Demo Management

Demo Class Schedule:

- **Upcoming demos:** Scheduled demo sessions
- **Demo preparation:** Student background, expectations
- **Demo guidelines:** Standard demo class structure

Post-Demo Process:

- **Video upload:** Demo session recording
- **Feedback form:** Structured feedback about demo session
 - Student engagement level
 - Topics covered
 - Student's current level assessment
 - Recommendations for regular classes
- **Conversion status:** Whether demo led to enrollment

Content Management

Class Video Uploads

Video Requirements:

- **Mandatory upload:** Every class must have uploaded video
- **Upload deadline:** Within 2 hours of class completion
- **Quality standards:** Minimum video and audio quality requirements
- **File naming:** Standardized naming convention

Upload Process:

1. Complete class → 2. Process/edit video → 3. Upload to platform
→
4. Add description → 5. Tag relevant topics → 6. Submit for
review

Quality Assurance:

- **Automatic reminders:** If video not uploaded within 1 hour
- **Quality feedback:** Admin feedback on video quality
- **Improvement suggestions:** Tips for better video quality

Communication

Contact Coordinators

Direct Communication:

- **Message system:** Direct messaging with department coordinators
- **Issue reporting:** Quick issue reporting with categories
- **Request submissions:** Schedule changes, leave requests, etc.
- **Emergency contact:** Urgent communication channels

Communication Guidelines:

- **Professional communication:** Formal tone and structure
- **Response expectations:** Expected response times
- **Escalation process:** When to escalate communication

Profile Management

Personal Information:

- **Basic details:** Update contact information, address
- **Professional details:** Qualifications, experience updates
- **Banking information:** Update payment details
- **Document management:** Upload updated certificates

Document Downloads:

- **Offer letter:** Employment offer letter
- **Company policies:** HR policies, code of conduct
- **Handbook:** Tutor guidelines and procedures
- **Certificates:** Training completion certificates

COORDINATOR FEATURES

Role-Based Access Control

Department-Specific Access:

- Coordinators only access features assigned by Super Admin
- Cannot view other departments' data
- Limited to operational functions, no system settings

Available Features (as assigned by Super Admin):

- All Super Admin features except:
 - System settings
 - User role management
 - Department creation
 - Super admin profile access

Operational Differences from Super Admin

Modified Permissions:

- **Read-only settings:** Can view but not modify system settings
- **Department isolation:** Only see assigned department data
- **Limited user management:** Cannot create/delete admin accounts
- **Approval workflows:** Some actions require super admin approval

TECHNICAL SPECIFICATIONS

Database Requirements

User Management:

- User authentication and session management
- Role-based access control
- Password security and reset functionality

Academic Management:

- Student and tutor profile management
- Class scheduling and management
- Attendance tracking and reporting

Financial Management:

- Fee tracking and payment processing
- Salary calculation and management
- Financial reporting and analytics

Integration Requirements

Email System:

- SMTP integration for email notifications
- Email templates for various notifications
- Bulk email capabilities

SMS Integration:

- SMS gateway for notifications
- Automated reminders and alerts
- Emergency communication

Video Platform Integration:

- Support for multiple video platforms (Zoom, Google Meet, etc.)
- API integration for automatic meeting creation
- Recording management

Payment Gateway:

- Online payment processing
- Multiple payment method support
- Payment tracking and reconciliation

Security Requirements

Data Protection:

- Encrypted password storage
- Secure file upload and storage
- Data backup and recovery

Access Control:

- Session management and timeout
- Role-based feature access
- Audit logging for all actions

Performance Requirements

Scalability:

- Support for multiple departments
- Concurrent user handling
- Database optimization for large datasets

Reliability:

- 99.9% uptime requirement
- Automated backup systems
- Error handling and recovery

Mobile Responsiveness

Responsive Design:

- Mobile-first approach
- Touch-friendly interfaces
- Optimized for tablets and smartphones

Mobile App Considerations:

- Native app development potential
- Push notifications
- Offline capability for essential features

IMPLEMENTATION GUIDELINES

Development Phases

Phase 1: Core System

- User authentication and management
- Basic profile management
- Department setup

Phase 2: Academic Management

- Tutor and student management
- Class scheduling and allocation
- Basic attendance tracking

Phase 3: Advanced Features

- Financial management
- Reporting system
- Video quality management

Phase 4: Communication & Integration

- Email and SMS integration
- Video platform integration
- Advanced reporting and analytics

Testing Requirements

Functional Testing:

- All user workflows
- Role-based access testing
- Data validation and error handling

Performance Testing:

- Load testing for concurrent users
- Database performance optimization
- File upload and processing speed

Security Testing:

- Penetration testing
- Data encryption verification

- Access control validation

Deployment Considerations

Server Requirements:

- Cloud hosting recommendations
- Database server specifications
- Content delivery network (CDN) for file storage

Maintenance:

- Regular backup schedules
- Update deployment process
- Performance monitoring and optimization

This specification provides a complete blueprint for developing a comprehensive LMS system that any development team or AI can understand and implement effectively.

Core System APIs

1.1 Authentication & Authorization API

Base URL: /api/v1/auth

Endpoints:

POST /login

POST /logout

POST /forgot-password

POST /reset-password

POST /refresh-token

GET /verify-token

POST /change-password

1.2 User Management API

Base URL: /api/v1/users

Endpoints:

GET	/users	# List all users
POST	/users	# Create new user
GET	/users/{id}	# Get user details
PUT	/users/{id}	# Update user
DELETE	/users/{id}	# Deactivate user
POST	/users/{id}/activate	# Activate user
GET	/users/by-department/{dept_id}	
GET	/users/by-role/{role}	

1.3 Department Management API

Base URL: /api/v1/departments

Endpoints:

GET	/departments	# List all departments
POST	/departments	# Create department
GET	/departments/{id}	# Get department details
PUT	/departments/{id}	# Update department
GET	/departments/{id}/permissions	# Get department permissions
PUT	/departments/{id}/permissions	# Update permissions
GET	/departments/{id}/users	# Get users in department

1.4 Tutor Management API

Base URL: /api/v1/tutors

Endpoints:

GET	/tutors	# List all tutors
POST	/tutors	# Create tutor profile
GET	/tutors/{id}	# Get tutor details
PUT	/tutors/{id}	# Update tutor
GET	/tutors/{id}/availability	# Get tutor availability

PUT	/tutors/{id}/availability	# Update availability
GET	/tutors/{id}/classes	# Get tutor's classes
GET	/tutors/{id}/students	# Get tutor's students
GET	/tutors/{id}/salary	# Get salary information
POST	/tutors/{id}/documents	# Upload documents
GET	/tutors/filter	# Filter tutors by criteria

1.5 Student Management API

Base URL: /api/v1/students

Endpoints:

GET	/students	# List all students
POST	/students	# Create student profile
GET	/students/{id}	# Get student details
PUT	/students/{id}	# Update student
GET	/students/{id}/classes	# Get student's classes
GET	/students/{id}/attendance	# Get attendance
GET	/students/{id}/fees	# Get fee information
POST	/students/{id}/documents	# Upload documents
GET	/students/filter	# Filter students

1.6 Class Management API

Base URL: /api/v1/classes

Endpoints:

GET	/classes	# List all classes
POST	/classes	# Create new class
GET	/classes/{id}	# Get class details
PUT	/classes/{id}	# Update class
DELETE	/classes/{id}	# Cancel class
POST	/classes/{id}/reschedule	# Reschedule class
GET	/classes/today	# Today's classes
GET	/classes/by-tutor/{tutor_id}	
GET	/classes/by-student/{student_id}	

POST /classes/allocate # Allocate classes

1.7 Attendance API

Base URL: /api/v1/attendance

Endpoints:

POST /attendance # Mark attendance
GET /attendance/class/{class_id}
GET /attendance/tutor/{tutor_id}
GET /attendance/student/{student_id}
GET /attendance/reports # Generate reports
PUT /attendance/{id} # Update attendance

1.8 Timetable API

Base URL: /api/v1/timetable

Endpoints:

GET /timetable # Get timetable view
GET /timetable/tutor/{tutor_id}
GET /timetable/student/{student_id}
GET /timetable/department/{dept_id}
GET /timetable/today
GET /timetable/week
GET /timetable/month
POST /timetable/temp-class # Add temporary class

1.9 Financial Management API

Base URL: /api/v1/finance

Tutor Salary Endpoints:

GET /finance/salary/tutor/{tutor_id}
POST /finance/salary/calculate # Calculate monthly salary

```
GET    /finance/salary/reports
PUT    /finance/salary/{id}/edit # Edit salary details
POST   /finance/salary/export     # Export to Excel
```

Student Fee Endpoints:

```
GET    /finance/fees/student/{student_id}
POST   /finance/fees/payment           # Record payment
GET    /finance/fees/pending          # Pending payments
GET    /finance/fees/reports
POST   /finance/fees/reminder         # Send payment reminders
```

1.10 Demo Classes API

Base URL: /api/v1/demo

Endpoints:

```
GET    /demo/classes                # List demo classes
POST   /demo/classes                # Schedule demo
GET    /demo/classes/{id}           # Get demo details
PUT    /demo/classes/{id}           # Update demo
POST   /demo/classes/{id}/feedback # Submit feedback
GET    /demo/conversion-reports     # Conversion analytics
```

1.11 Escalation Management API

Base URL: /api/v1/escalations

Endpoints:

```
GET    /escalations                # List all escalations
POST   /escalations                # Create new escalation
GET    /escalations/{id}           # Get escalation details
PUT    /escalations/{id}           # Update escalation
POST   /escalations/{id}/assign    # Assign to user
POST   /escalations/{id}/resolve   # Mark as resolved
GET    /escalations/my-assigned    # User's assigned escalations
```

1.12 Communication API

Base URL: /api/v1/communication

Notice Endpoints:

GET	/communication/notices	# List notices
POST	/communication/notices	# Create notice
GET	/communication/notices/{id}	
PUT	/communication/notices/{id}	
POST	/communication/notices/{id}/publish	

Email Endpoints:

POST	/communication/email/send	# Send email
GET	/communication/email/templates	
POST	/communication/email/bulk	# Bulk email
GET	/communication/email/history	

1.13 File Management API

Base URL: /api/v1/files

Endpoints:

POST	/files/upload	# Upload file
GET	/files/{id}	# Download file
DELETE	/files/{id}	# Delete file
GET	/files/by-type/{type}	# Get files by type
POST	/files/video/upload	# Upload class videos
GET	/files/video/quality-check	# Quality check videos

1.14 Reports API

Base URL: /api/v1/reports

Endpoints:

GET	/reports/financial	# Financial reports
GET	/reports/attendance	# Attendance reports
GET	/reports/academic	# Academic performance

GET	/reports/operational	# Operational reports
POST	/reports/custom	# Generate custom reports
GET	/reports/export/{format}	# Export reports (pdf/excel)

2. EXTERNAL API INTEGRATIONS

2.1 Email Service Integration

SMTP Configuration API

Provider Options:

- Gmail SMTP

Email Template API

POST /api/v1/email/send

Request:

```
{
  "template": "welcome_tutor",
  "to": ["tutor@example.com"],
  "variables": {
    "tutor_name": "John Doe",
    "username": "john_doe",
    "password": "temp_password",
    "login_url": "https://yourlms.com/login"
  }
}
```

Email Templates Required:

1. **Welcome Email** (Tutors/Students/Coordinators)
2. **Password Reset Email**
3. **Class Reminder Email** (5 minutes before)
4. **Class Assignment Email**
5. **Attendance Alert Email**
6. **Salary Slip Email**

7. Fee Payment Reminder
8. Demo Class Confirmation
9. Escalation Assignment Email
10. Notice Distribution Email

2.5 Cloud Storage Integration

AWS S3 Integration

Configuration:

```
{  
  "access_key_id": "your_access_key",  
  "secret_access_key": "your_secret_key",  
  "bucket_name": "your-lms-bucket",  
  "region": "us-east-1"  
}
```

File Upload:

POST /api/v1/storage/s3/upload

Request: (multipart/form-data)

```
{  
  "file": file_object,  
  "path": "videos/tutor_123/class_456.mp4",  
  "metadata": {  
    "tutor_id": 123,  
    "class_id": 456,  
    "upload_date": "2025-07-01"  
  }  
}
```

2.6 Calendar Integration

Google Calendar API

Configuration:

```
{
```

```
"client_id": "your_google_client_id",
"client_secret": "your_google_client_secret",
"redirect_uri": "your_redirect_uri"
}
```

Event Creation:

POST /api/v1/calendar/google/create-event

Request:

```
{
  "summary": "Mathematics Class",
  "description": "Class with John Doe",
  "start": {
    "dateTime": "2025-07-01T10:00:00",
    "timeZone": "Asia/Kolkata"
  },
  "end": {
    "dateTime": "2025-07-01T11:00:00",
    "timeZone": "Asia/Kolkata"
  },
  "attendees": [
    {"email": "tutor@example.com"},
    {"email": "student@example.com"}
  ],
  "reminders": {
    "useDefault": false,
    "overrides": [
      {"method": "popup", "minutes": 10},
      {"method": "email", "minutes": 1440}
    ]
  }
}
```

2.8 Notification Services

Firebase Cloud Messaging (FCM)

Configuration:

```
{
```

```
"server_key": "your_fcm_server_key",  
"sender_id": "your_sender_id"  
}
```

Push Notification:

POST /api/v1/notifications/fcm/send

Request:

```
{  
  "to": "device_token",  
  "notification": {  
    "title": "Class Starting Soon",  
    "body": "Your Mathematics class starts in 5 minutes"  
  },  
  "data": {  
    "class_id": "456",  
    "action": "join_class"  
  }  
}
```

3. WEBHOOK INTEGRATIONS

3.1 Payment Webhooks

Payment Success Webhook:

POST /webhooks/payment/success

```
{  
  "payment_id": "pay_xyz123",  
  "student_id": 123,  
  "amount": 5000,  
  "currency": "INR",  
  "status": "captured",  
  "fee_type": "monthly_tuition"  
}
```

Payment Failed Webhook:

POST /webhooks/payment/failed

```
{
  "payment_id": "pay_xyz123",
  "student_id": 123,
  "amount": 5000,
  "error_code": "card_declined",
  "error_description": "Insufficient funds"
}
```

3.2 Video Platform Webhooks

Meeting Started Webhook:

POST /webhooks/video/meeting-started

```
{
  "meeting_id": "123456789",
  "class_id": 456,
  "platform": "zoom",
  "started_at": "2025-07-01T10:00:00Z"
}
```

Meeting Ended Webhook:

POST /webhooks/video/meeting-ended

```
{
  "meeting_id": "123456789",
  "class_id": 456,
  "platform": "zoom",
  "ended_at": "2025-07-01T11:00:00Z",
  "duration": 60,
  "participants": [
    {"user_id": "tutor_123", "join_time": "10:00", "leave_time":
"11:00"},
    {"user_id": "student_456", "join_time": "10:02", "leave_time":
"11:00"}
  ]
}
```

4. API SECURITY & AUTHENTICATION

4.1 JWT Token Management

Token Structure:

```
{
  "user_id": 123,
  "role": "tutor",
  "department": "K12",
  "permissions": ["view_classes", "mark_attendance"],
  "exp": 1625097600,
  "iat": 1625011200
}
```

Token Refresh:

POST /api/v1/auth/refresh-token

Request:

```
{
  "refresh_token": "refresh_token_here"
}
```

4.2 API Rate Limiting

Rate Limits:

- Authentication: 5 requests per minute
- File Upload: 10 requests per minute
- General API: 100 requests per minute
- Bulk Operations: 10 requests per minute

Headers:

X-RateLimit-Limit: 100

X-RateLimit-Remaining: 99

X-RateLimit-Reset: 1625097600

4.3 API Key Management

External Service API Keys:

```
{
  "email_service": "sendgrid_api_key",
  "sms_service": "twilio_api_key",
  "video_service": "zoom_api_key",
  "payment_service": "razorpay_api_key",
  "storage_service": "aws_access_key"
}
```

5. DATA SYNCHRONIZATION APIS

5.1 Department-Based Data Sync

GET /api/v1/sync/department/{dept_id}

Response:

```
{
  "users": [...],
  "tutors": [...],
  "students": [...],
  "classes": [...],
  "last_sync": "2025-07-01T10:00:00Z"
}
```

5.2 Real-time Updates

WebSocket Connections:

wss://yourlms.com/ws/updates

Subscription:

```
{
  "type": "subscribe",
  "channel": "classes",
  "filters": {
```

```
    "tutor_id": 123
  }
}

Update Message:
{
  "type": "class_update",
  "data": {
    "class_id": 456,
    "status": "rescheduled",
    "new_time": "2025-07-01T11:00:00Z"
  }
}
```

7. INTEGRATION TESTING APIS

7.1 Sandbox/Testing Endpoints

Test Mode Headers:

X-Test-Mode: true

X-Test-Scenario: "payment_success" // or "payment_failed"

Test Data Reset:

POST /api/v1/test/reset-data

DELETE /api/v1/test/cleanup-test-users

7.2 Health Check APIs

GET /api/v1/health

Response:

```
{
  "status": "healthy",
  "services": {
    "database": "connected",
    "email": "connected",
```



```
    "sms": "connected",  
    "storage": "connected"  
  },  
  "timestamp": "2025-07-01T10:00:00Z"  
}
```

8. API DOCUMENTATION & VERSIONING

8.1 API Versioning Strategy

URL Versioning: /api/v1/, /api/v2/

Header Versioning: API-Version: 1.0

Accept Header: Accept: application/vnd.lms.v1+json

8.2 API Documentation

Swagger/OpenAPI Integration:

GET /api/docs - API documentation

GET /api/v1/swagger.json - OpenAPI specification

This comprehensive API specification covers all internal and external integrations needed for the LMS system. Each API endpoint includes proper authentication, error handling, and follows RESTful principles for consistent implementation.