

Meeting Matters LMS

Features & Functionalities Documentation

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System Overview

Meeting Matters LMS is a comprehensive Learning Management System built with modern web technologies. It provides a complete educational platform supporting multiple user roles, course management, progress tracking, assessments, certificate generation, and payment processing.

Core Capabilities

- Multi-role user management (Admin, Instructor, Learner)
- Hierarchical course structure (Course -> Module -> Content)
- Interactive assessments and quizzes
- Certificate generation with PDF export
- E-commerce functionality with shopping cart
- Payment processing (Stripe & PayPal)
- Student progress tracking and analytics
- Email notifications and communications
- Content library management
- Note-taking and bookmarking

User Roles & Authentication

Authentication Methods

1. **Email/Password Authentication**
 - User registration with validation
 - Secure password hashing (bcrypt with 12 salt rounds)
 - Session-based authentication
 - Role-based access control
2. **Google OAuth (Optional)**

- Single Sign-On with Google accounts
- Automatic user creation from Google profile
- Email verification through Google

User Roles

1. ****Learner (Student)****

- Default role for new registrations
- Can enroll in courses
- Submit assignments and take quizzes
- Earn certificates upon completion
- Purchase courses through the platform

2. ****Instructor****

- Create and manage courses
- Grade assignments and view quiz results
- Monitor student progress
- Access teaching analytics
- Manage course content and modules

3. ****Admin****

- Full system access
- User management and role assignment
- Course approval and oversight
- Payment processing and verification
- System-wide analytics and reporting
- Certificate template management
- Content library administration

User Profile Information

- Basic information: First name, last name, email
- Extended profile: Date of birth, gender, country, city
- Contact: Phone number, emergency contact
- Education: Education level, field of study
- Learning preferences: Learning goals, interests
- Marketing: Email subscription preferences
- Account status: Email verification, active status

Student Features

Course Discovery & Enrollment

- ****Browse Courses****: View all published courses with thumbnails and descriptions
- ****Course Details****: View detailed course information, modules, and content
- ****Shopping Cart****: Add multiple courses to cart before checkout
- ****Recommendations****: Receive personalized course recommendations
- ****Enrollment Status****: Track enrolled vs. available courses

Learning Experience

- ****Module Navigation****: Progress through courses module-by-module
- ****Content Types****: Access videos, audio, PDFs, and documents
- ****Progress Tracking****: Automatic tracking of completed content

- **Sequential Learning**: Complete content in order (if prerequisites set)
- **Duration Tracking**: View estimated time for each content item

Assessment & Assignments

- **Interactive Quizzes**:
 - Multiple choice questions
 - True/false questions
 - Fill-in-the-blank questions
 - Immediate feedback on answers
 - Passing score requirements
 - Multiple attempt support
- **Assignment Submission**:
 - Upload assignment files
 - View submission history
 - Receive grades and feedback
 - Track submission deadlines

Note-Taking

- **Personal Notes**: Create notes while learning
- **Rich Text Editor**: Format notes with Quill.js
- **Search Functionality**: Search across all notes
- **Organization**: Associate notes with specific courses/modules
- **CRUD Operations**: Create, read, update, delete notes

Certificates

- **Automatic Generation**: Receive certificates upon course completion
- **PDF Download**: Download certificates as PDF files
- **Certificate Verification**: Unique verification codes
- **Email Delivery**: Certificates sent via email
- **View History**: Access all earned certificates

Shopping & Payment

- **Shopping Cart**: Add/remove courses, view totals
- **Promo Codes**: Apply discount codes at checkout
- **Multiple Payment Options**: Stripe and PayPal integration
- **Payment History**: View all transactions and receipts
- **Order Management**: Track order status and details

Instructor Features

Course Creation & Management

- **Course Builder**: Drag-and-drop course creation interface
- **Course Information**:
 - Title and description
 - Course thumbnail image
 - Tags and categorization
 - Duration and difficulty level
 - Pricing information
- **Module Management**:
 - Create hierarchical course structure

- Set module order and prerequisites
- Add descriptions to modules
- Reorder modules via drag-and-drop
- ****Content Upload****:
- Video content (MP4, AVI, MOV, WMV, FLV, WebM)
- Audio content (MP3, WAV, OGG, M4A, AAC)
- PDF documents
- Word documents (DOC, DOCX)
- Automatic duration calculation
- File size limits and validation

Assessment Creation

- ****Quiz Builder****:
- Create multiple question types
- Set correct answers and explanations
- Assign points per question
- Set passing score thresholds
- Preview quizzes before publishing
- ****Assignment Management****:
- Create assignment descriptions
- Set due dates and submission requirements
- Specify grading criteria
- Attach reference materials

Student Monitoring

- ****Progress Tracking****:
- View student enrollment data
- Monitor course completion rates
- Track module and content completion
- View quiz scores and attempts
- Monitor assignment submissions
- ****Grading Tools****:
- Grade assignment submissions
- Provide feedback to students
- Track grading history
- Bulk grading capabilities

Analytics & Reporting

- ****Course Analytics****:
- Enrollment statistics
- Completion rates
- Average quiz scores
- Time spent on content
- Student engagement metrics
- ****Student Analytics****:
- Individual student progress
- Performance trends
- Inactive student identification
- Session tracking

Course Management

- ****Publish/Unpublish****: Control course visibility
- ****Course Duplication****: Clone existing courses
- ****Status Management****: Draft, Published, Archived states
- ****Course Deletion****: Remove courses (with safeguards)

Admin Features

User Management

- ****View All Users****: Comprehensive user list with filters
- ****Create Users****: Manual user creation with role assignment
- ****Edit Users****: Update user information and profiles
- ****Delete Users****: Remove users from the system
- ****Role Management****: Assign/change user roles
- ****Instructor Creation****: Dedicated instructor account creation
- ****User Statistics****: Active users, registrations, demographics

Course Administration

- ****Course Oversight****: View all courses regardless of status
- ****Course Statistics****: Enrollment, completion, revenue data
- ****Course Approval****: Review and approve instructor courses
- ****Pricing Management****: Set and update course prices
- ****Bundle Management****: Create course bundles with package pricing
- ****Course Editing****: Modify any course content
- ****Course Deletion****: Remove courses with confirmation

Payment Management

- ****Payment Settings****:
 - Configure Stripe API keys
 - Configure PayPal credentials
 - Set default payment provider
 - Manage payment account settings
- ****Transaction Management****:
 - View all payment transactions
 - Verify manual payments
 - Process refunds
 - Generate receipts
 - Payment analytics dashboard
- ****Promo Code System****:
 - Create discount codes
 - Set percentage or fixed amount discounts
 - Set usage limits and expiration dates
 - Track promo code usage
 - Enable/disable promo codes
- ****Refund Management****:
 - View refund requests
 - Process refunds
 - Track refund history
 - Refund reasons and notes

Certificate Management

- **Certificate Templates**:
 - Create custom certificate templates
 - Define certificate layouts
 - Set template variables (name, date, course)
 - Preview templates
- **Certificate Issuance**:
 - Manually issue certificates
 - Bulk certificate generation
 - View all issued certificates
 - Resend certificates via email
 - Certificate verification codes

Content Library

- **Library Management**:
 - Upload reusable content
 - Categorize content
 - Set access permissions
 - Track content usage
 - Content analytics
- **Access Control**:
 - Grant/revoke user access
 - Role-based content access
 - Content visibility settings
 - Access history tracking

Enrollment Management

- **Manual Enrollment**: Enroll students in courses
- **Bulk Enrollment**: Enroll multiple students at once
- **Enrollment Status**: Track enrollment dates and progress
- **Enrollment Reports**: Generate enrollment reports

Communication Tools

- **Email Notifications**:
 - Welcome emails to new users
 - Registration notifications
 - Course enrollment confirmations
 - Certificate delivery
 - Payment receipts
- **Bulk Communications**: Send announcements to user groups

System Analytics

- **Dashboard Metrics**:
 - Total users, courses, enrollments
 - Revenue tracking
 - Active users and sessions
 - Completion rates
 - Payment statistics
- **Payment Analytics**:
 - Revenue by course

- Revenue by time period
- Payment method breakdown
- Refund statistics

Onboarding Tour Management

- **Tour Sections**: Create guided tours for new users
- **FAQ Management**: Manage frequently asked questions
- **Tour Settings**: Configure tour behavior and visibility
- **Section Ordering**: Reorder tour steps

Database Seeding

- **Sample Data**: Generate sample courses and users for testing
- **Demo Course**: Create demo courses for demonstrations

Course Management System

Course Structure

Course

Basic Information

Title

Description

Thumbnail Image

Tags

Status (Draft/Published/Archived)

Pricing

Modules

Module 1

Title & Description

Order/Sequence

Content Items

Videos

Audio

Documents

Quizzes

Assignments

Module 2...

Enrollment & Prerequisites

Course Creation Workflow

1. **Course Setup**: Create course with basic information
2. **Module Creation**: Add modules in desired order
3. **Content Upload**: Upload content to each module
4. **Assessment Addition**: Add quizzes and assignments
5. **Preview**: Review course structure
6. **Publishing**: Publish course for student enrollment

Course Features

- **Prerequisites**: Require completion of other courses
- **Sequential Learning**: Lock content until previous items completed
- **Duration Tracking**: Automatic duration calculation for all content
- **Progress Tracking**: Track student progress through courses

- **Completion Certificates**: Auto-generate upon completion

Content Management

Supported Content Types

1. **Video Content**

- **Formats**: MP4, AVI, MOV, WMV, FLV, WebM
- **Max Size**: 100MB
- **Features**:
 - Automatic duration calculation
 - Embedded video player
 - Progress tracking
 - Playback controls

2. **Audio Content**

- **Formats**: MP3, WAV, OGG, M4A, AAC
- **Max Size**: 50MB
- **Features**:
 - Enhanced audio player
 - Automatic duration calculation
 - Waveform visualization
 - Playback speed control

3. **Document Content**

- **PDF Files**: Full PDF rendering
- **Word Documents**: DOC, DOCX support
- **Max Size**: 100MB
- **Features**:
 - In-browser PDF viewer
 - Page count calculation
 - Duration estimation (reading time)
 - Download capability

4. **Image Content**

- **Formats**: JPEG, PNG, GIF, WebP
- **Max Size**: 5MB
- **Features**:
 - Automatic optimization (Sharp.js)
 - Thumbnail generation (1200x675)
 - Quality compression (85%)
 - Progressive JPEG loading

Upload System

- **Memory-based Upload**: Multer with memory storage
- **File Type Validation**: MIME type checking
- **Size Validation**: Per-file type size limits
- **Error Handling**: Detailed error messages
- **Progress Tracking**: Upload progress indicators

Duration Calculation

- **Video**: Extracted using get-video-duration library
- **Audio**: Extracted using get-audio-duration library
- **PDF**: Estimated based on page count (2 minutes per page)
- **Documents**: Fallback estimation (5 minutes)

Assessment & Quiz Engine

Question Types

1. **Multiple Choice**

- Single correct answer from multiple options
- 2-6 answer options
- Points per question
- Explanation for correct answer

2. **True/False**

- Binary choice questions
- Simplified multiple choice
- Quick assessment format

3. **Fill-in-the-Blank**

- Text input answers
- Case-sensitive or insensitive matching
- Multiple acceptable answers support

Quiz Features

- **Attempts**: Track all quiz attempts per student
- **Scoring**: Automatic grading with immediate feedback
- **Passing Score**: Set minimum passing percentage
- **Time Tracking**: Record time spent on quizzes
- **Review Mode**: Students can review answers after submission
- **Explanations**: Show explanations for correct/incorrect answers
- **Progress Impact**: Quiz completion required for course progress

Assignment System

- **File Upload**: Students upload assignment files
- **Submission Tracking**: Track submission date and time
- **Grading**: Instructors assign scores and feedback
- **Multiple Submissions**: Support for resubmissions
- **Grade History**: Track grading history
- **Feedback**: Text feedback from instructors

Certificate System

Certificate Generation

- **Automatic Trigger**: Generated upon course completion
- **PDF Generation**: Using pdf-lib library
- **Custom Templates**: Admin-configurable templates
- **Personalization**: Student name, course title, completion date
- **Verification Code**: Unique code for authenticity

- **Digital Signature**: Optional signature images

Certificate Features

- **PDF Download**: Download certificates as PDF
- **HTML Preview**: View certificates in browser
- **Email Delivery**: Automatic email delivery upon issuance
- **Certificate Library**: Students can view all earned certificates
- **Re-send Option**: Admin can resend certificates via email
- **Template Management**: Multiple certificate templates
- **Verification System**: Verify certificate authenticity

Certificate Templates

- **Custom Layouts**: HTML-based templates
- **Variables**: Dynamic content (name, course, date, etc.)
- **Styling**: CSS styling for professional appearance
- **Logo Integration**: Include organization logos
- **Preview Mode**: Preview before issuance

Payment & E-commerce

Shopping Cart System

- **Add to Cart**: Add courses to shopping cart
- **Remove Items**: Remove individual items
- **Update Quantity**: Modify cart quantities
- **Cart Persistence**: Cart saved in database
- **Cart Count**: Display cart item count
- **Clear Cart**: Empty entire cart
- **Cart Calculation**: Automatic total calculation

Checkout Process

1. **Cart Review**: Review items and quantities
2. **Promo Code**: Apply discount codes
3. **Order Calculation**: Calculate total with discounts
4. **Payment Method**: Select Stripe or PayPal
5. **Payment Processing**: Process payment
6. **Enrollment**: Automatic course enrollment
7. **Confirmation**: Email receipt and confirmation

Payment Integration

Stripe Integration

- **Stripe Checkout**: Embedded payment form
- **Payment Intents**: Secure payment processing
- **Card Payments**: Credit/debit card support
- **3D Secure**: Enhanced security for card payments
- **Webhook Support**: Payment status updates

PayPal Integration

- **PayPal SDK**: Server-side PayPal integration
- **PayPal Checkout**: PayPal payment flow
- **Payment Capture**: Automatic payment capture

- ****Refund Support****: Process refunds through PayPal

Promo Code System

- ****Discount Types****: Percentage or fixed amount
- ****Usage Limits****: Maximum number of uses
- ****Expiration Dates****: Time-limited promotions
- ****Course Restrictions****: Apply to specific courses
- ****User Restrictions****: Limit to specific users
- ****Validation****: Real-time code validation
- ****Usage Tracking****: Track promo code usage

Payment Management

- ****Transaction History****: View all transactions
- ****Payment Verification****: Manual payment verification
- ****Receipt Generation****: Automatic receipt creation
- ****Refund Processing****: Process refunds
- ****Payment Analytics****: Revenue tracking and reporting

Bundle Pricing

- ****Course Bundles****: Package multiple courses
- ****Bundle Pricing****: Discounted bundle rates
- ****Bundle Management****: Add/remove courses from bundles
- ****Bundle Enrollment****: Enroll in all bundle courses

Communication System

Email Service

- ****Multiple Providers****: SendGrid and Nodemailer support
- ****Email Templates****: HTML email templates
- ****Transactional Emails****:
 - Welcome emails
 - Registration confirmations
 - Enrollment notifications
 - Certificate delivery
 - Payment receipts
 - Password reset (if implemented)

Notification Types

1. ****Student Registration****: Admin notified of new registrations
2. ****Course Enrollment****: Student notified of enrollment
3. ****Certificate Issuance****: Student receives certificate via email
4. ****Payment Confirmation****: Receipt sent after payment
5. ****Assignment Grading****: Student notified of grades
6. ****Course Completion****: Congratulations on course completion

Email Configuration

- ****SMTP Settings****: Configurable SMTP server
- ****SendGrid API****: SendGrid API key configuration
- ****From Address****: Customizable sender email
- ****Template Customization****: Custom email templates

Technical Architecture

Frontend Stack

- **Framework**: React 18 with TypeScript
- **Build Tool**: Vite
- **Routing**: Wouter (lightweight React router)
- **State Management**: TanStack Query (React Query)
- **Styling**: Tailwind CSS
- **UI Components**: Shadcn/ui with Radix UI primitives
- **Forms**: React Hook Form with Zod validation
- **Rich Text**: Quill.js for note editor
- **Drag & Drop**: @dnd-kit for course builder

Backend Stack

- **Framework**: Express.js with TypeScript
- **Database**: PostgreSQL with Drizzle ORM
- **Authentication**: Express Session + Passport.js
- **Session Store**: PostgreSQL session store
- **File Uploads**: Multer
- **Image Processing**: Sharp
- **PDF Generation**: pdf-lib
- **Email**: SendGrid + Nodemailer

Database Schema

- **Users**: User accounts and profiles
- **Courses**: Course information and metadata
- **Modules**: Course modules and structure
- **ModuleContent**: Content items (videos, PDFs, etc.)
- **Enrollments**: Student course enrollments
- **Progress**: Content completion tracking
- **Quizzes**: Quiz definitions
- **QuizQuestions**: Individual quiz questions
- **QuizAttempts**: Student quiz attempts
- **Assignments**: Assignment definitions
- **AssignmentSubmissions**: Student submissions
- **Certificates**: Issued certificates
- **CertificateTemplates**: Certificate templates
- **ShoppingCart**: User shopping carts
- **CartItems**: Individual cart items
- **Orders**: Purchase orders
- **PaymentTransactions**: Payment records
- **PromoCodes**: Discount codes
- **PersonalNotes**: User notes
- **LibraryContent**: Content library items

Security Features

- **Password Hashing**: bcrypt with 12 salt rounds
- **Session Management**: Secure session cookies
- **CSRF Protection**: Session-based CSRF protection
- **Role-based Access**: Middleware for role verification
- **Input Validation**: Zod schema validation
- **SQL Injection Prevention**: Parameterized queries via Drizzle ORM

- **File Upload Validation**: MIME type and size validation
- **XSS Prevention**: React's built-in XSS protection

Performance Optimizations

- **Database Connection Pooling**: Efficient database connections
- **Image Optimization**: Automatic image compression
- **Caching**: React Query caching for API responses
- **Lazy Loading**: Code splitting and lazy route loading
- **Progressive Images**: Progressive JPEG loading

API Endpoints Overview

Authentication Endpoints

POST	/api/signup	# User registration
POST	/api/login	# User login
GET	/api/logout	# User logout
GET	/api/auth/user	# Get current user
POST	/api/auth/register	# Extended registration
GET	/auth/google	# Google OAuth initiation
GET	/auth/google/callback	# Google OAuth callback

User Management (Admin)

GET	/api/admin/users	# List all users
POST	/api/admin/users	# Create user
PUT	/api/admin/users/:id	# Update user
DELETE	/api/admin/users/:id	# Delete user
PATCH	/api/users/:id/role	# Update user role
POST	/api/admin/create-instructor	# Create instructor

Course Endpoints

GET	/api/courses	# List published courses
GET	/api/courses/:id	# Get course details
GET	/api/courses/enrolled	# User's enrolled courses
GET	/api/courses/recommended	# Recommended courses
GET	/api/instructor/courses	# Instructor's courses
POST	/api/instructor/courses	# Create course
PUT	/api/courses/:id	# Update course
DELETE	/api/instructor/courses/:id	# Delete course
PATCH	/api/instructor/courses/:id/publish	# Publish course
POST	/api/instructor/courses/:id/duplicate	# Duplicate course
GET	/api/admin/courses	# Admin: all courses
PATCH	/api/admin/courses/:courseId/pricing	# Update pricing

Module & Content Endpoints

POST	/api/instructor/courses/:courseId/modules	# Create module
GET	/api/courses/:courseId/modules	# List modules
POST	/api/instructor/modules/:id/content	# Add content
POST	/api/instructor/modules/:id/quizzes	# Add quiz
POST	/api/instructor/modules/:id/assignments	# Add assignment
POST	/api/modules/content/:id/complete	# Mark complete

Assessment Endpoints

POST /api/quiz-attempts # Submit quiz
GET /api/quiz-attempts/:quizId # Get quiz attempts
POST /api/assignments/:id/submit # Submit assignment
POST /api/instructor/assignments/:id/grade # Grade assignment
PATCH /api/admin/quiz/:quizId/passing-score # Update passing score

Certificate Endpoints

GET /api/certificates # User's certificates
GET /api/certificates/:id # Certificate details
GET /api/certificates/:id/view # View certificate HTML
GET /api/certificates/:id/download # Download PDF
POST /api/certificates/generate # Generate certificate
GET /api/admin/certificates # All certificates
POST /api/admin/certificates/issue # Issue certificate

Cart & Payment Endpoints

GET /api/cart # Get user cart
POST /api/cart/add # Add to cart
DELETE /api/cart/items/:itemId # Remove from cart
DELETE /api/cart/clear # Clear cart
GET /api/cart/count # Cart item count
POST /api/promo-codes/validate # Validate promo code
POST /api/orders # Create order
POST /api/orders/:id/payment # Process payment
GET /api/orders # User's orders
GET /api/student/payments # Payment history
GET /api/receipts/:transactionId # Get receipt

File Upload Endpoints

POST /api/upload/image # Upload image
POST /api/upload/video # Upload video
POST /api/upload/audio # Upload audio
POST /api/upload/document # Upload document

Notes Endpoints

GET /api/personal-notes # List notes
POST /api/personal-notes # Create note
GET /api/personal-notes/:id # Get note
PUT /api/personal-notes/:id # Update note
DELETE /api/personal-notes/:id # Delete note
GET /api/personal-notes/search # Search notes

Library Content (Admin)

GET /api/admin/library-content # List library content
POST /api/admin/library-content # Create content
PUT /api/admin/library-content/:id # Update content
DELETE /api/admin/library-content/:id # Delete content
GET /api/library/my-content # User's accessible content

Admin Analytics

GET /api/admin/payment-analytics # Payment analytics

GET /api/student-monitoring # Student monitoring
GET /api/student-monitoring/summary # Monitoring summary
GET /api/student-monitoring/progress/:studentId # Student progress

Development Guidelines

Code Organization

- **Frontend**: `client/src/` directory
- `components/`: Reusable UI components
- `pages/`: Route-based page components
- `hooks/`: Custom React hooks
- `lib/`: Utility functions
- **Backend**: `server/` directory
- `routes.ts`: API route definitions
- `storage/`: Database storage layer
- `auth-middleware.ts`: Authentication middleware
- **Shared**: `shared/` directory
- `schema.ts`: Database schema and types
- `env.ts`: Environment configuration

Testing Considerations

- End-to-end testing with Playwright
- API testing with proper authentication
- Role-based access testing
- Payment flow testing (use test keys)
- File upload testing
- Quiz and assignment workflows

Deployment Notes

- Environment variables required:
- `SESSION_SECRET`: Session encryption key
- `DATABASE_URL`: PostgreSQL connection string
- `GOOGLE_CLIENT_ID/SECRET`: Optional for Google OAuth
- `STRIPE_SECRET_KEY`: For payment processing
- `SENDGRID_API_KEY` or SMTP settings: For emails
- Database migrations via Drizzle
- Static asset serving for uploads
- SSL/TLS for production

Additional Notes for Developers

Key Design Patterns

- **Repository Pattern**: Storage layer abstracts database operations
- **Middleware Pattern**: Authentication and authorization middleware
- **Factory Pattern**: Certificate generation and template system
- **Observer Pattern**: Email notifications triggered by events

Performance Considerations

- Database indexing on frequently queried fields
- Image optimization before storage

- Lazy loading of course content
- Query optimization for analytics
- Session store in database for scalability

Extensibility Points

- Payment providers (can add more beyond Stripe/PayPal)
- Email providers (SendGrid, Nodemailer, or others)
- Content types (can add new content types)
- Certificate templates (customizable)
- Authentication methods (OAuth providers)

Known Dependencies

- PostgreSQL database (required)
- Email service (SendGrid or SMTP)
- Payment gateway accounts (Stripe and/or PayPal)
- Node.js 18+ runtime
- Modern browser with JavaScript enabled

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For technical implementation details, refer to the codebase and inline code documentation.