

Learning Management System (LMS) – Feature Breakdown (with Automatic Grading)

1. User Accounts & Access

- Users can **sign up, log in**, and access courses securely.
 - Three roles:
 - **Admin** – full control
 - **Instructor** – creates courses and quizzes
 - **Student** – learns and takes quizzes
 - Password reset and account verification included.
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2. Course Management

- Instructors can **create, edit, and publish** their own courses.
 - Each course includes:
 - Title, description, duration, and difficulty
 - Organized lessons and sections
 - Video lectures, PDFs, or presentations
 - Admin can approve or disable any course.
 - Students can **browse and enroll** in available courses.
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3. Instructor Dashboard

- Instructors can:
 - View their courses

- See total enrolled students
 - Create and edit **auto-graded quizzes**
 - Track overall student progress (automatically calculated)
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4. Student Dashboard

- Students can:
 - Enroll and view their active courses
 - Watch videos and study materials
 - Take quizzes after lessons
 - See quiz scores instantly
 - Download **completion certificate** once they pass
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5. Auto-Graded Quizzes

- Supports **multiple-choice (MCQ)** and **true/false** questions.
- Each quiz is **automatically graded** by the system:
 - Student gets an instant score
 - Pass/fail criteria is defined by the instructor
- The system automatically marks the course as “**Completed**” if all quizzes are passed.



No manual checking or intervention required.



6. Certificate Generation

- Once a student completes and passes all quizzes:
 - A **personalized certificate** is automatically generated.

- Includes:
 - Student's name
 - Course name
 - Completion date
 - Instructor's name (optional)
 - Certificates can be **downloaded as PDF** or shared.
 - Each certificate gets a **unique ID or QR code** for verification.
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7. Payment & Enrollment

- Courses can be **free or paid**.
 - Payments can be handled through:
 - **Stripe, Razorpay**
 - Automatic enrollment after successful payment.
 - Admin can view reports of sales and enrollments.
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8. Analytics & Reports

- **Students** can see their quiz performance and progress.
- **Instructors** can track:
 - Average quiz scores
 - Course completion rates
- **Admin** can track:
 - Number of courses, users, certificates issued, and revenue.

User Journey

1. Student Journey

Goal: Learn from courses, take quizzes, and earn certificates automatically.

Step-by-Step Flow:

1. Sign Up / Login

- The student creates an account using their email and password.
- After logging in, they can see all available courses.

2. Browse & Enroll

- The student browses courses (e.g., "Python Basics" or "Digital Marketing").
- Clicks "**Enroll**" to join a course (free or paid).

3. Start Learning

- The student watches lessons (videos, slides, or reading materials).
- Each lesson automatically tracks their progress.

4. Take Quiz / Test

- After completing a module or the full course, a quiz becomes available.
- The student answers multiple-choice or short-answer questions.
- Once submitted, the system **automatically grades** the answers.
- Immediate feedback (e.g., "You scored 8 out of 10") is shown.

5. Earn Certificate

- If the student's score meets the passing percentage (say, 70%), the system automatically **generates a course completion certificate**.
- The certificate includes:
 - Student's name
 - Course title
 - Instructor name

- Completion date
- Auto-generated unique certificate ID
- The student can **download or share** the certificate directly.

6. View Progress & Certificates

- Students can view all completed courses and certificates in one dashboard.
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2. Instructor Journey

Goal: Create courses, upload materials, design quizzes, and monitor performance.

Step-by-Step Flow:

1. Login as Instructor

- The instructor logs in to their account (approved by admin).

2. Create a Course

- Fills in course details like title, description, and difficulty level.
- Uploads lesson content (videos, PDFs, or text).
- Adds **quizzes** for each lesson or at the end of the course.
- Defines correct answers so the system can auto-grade student attempts.

3. Publish Course

- Once ready, the instructor publishes the course for students to enroll.

4. Monitor Student Progress

- The instructor dashboard shows how many students enrolled and their average scores.
 - They can update course content anytime.
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3. Admin Journey

Goal: Manage users, courses, and certificates to keep the platform running smoothly.

Step-by-Step Flow:

1. Login as Admin

- The admin signs in with full access rights.

2. Manage Users

- Approves instructor accounts.
- Can block or activate users when needed.

3. Monitor Courses

- Approves or reviews new course submissions.
- Can view enrollment stats and course completion rates.

4. System Oversight

- Tracks all certificates issued.
- Can customize certificate templates (logo, signature, etc.).
- Manages platform settings like course categories or notifications.

Technology

System Architecture Overview

Layer	Purpose	Technologies Used
Frontend (User Interface)	Website and dashboards for students, instructors, and admins	Angular
Backend (Application Logic)	Handles user accounts, quizzes, auto-grading, and certificate generation	Node.js + Express.js
Database Layer	Stores users, courses, quiz results, and certificates	MongoDB (Atlas)
Cloud & Media Layer (AWS)	Hosts videos, images, and certificates; manages streaming and scaling	AWS Cloud Services

AWS Services Breakdown

AWS Service	Role in the LMS	Description (Simple Terms)
Amazon S3 (Simple Storage Service)	File & video storage	All course videos, thumbnails, PDFs, and certificates are stored safely here.
Amazon CloudFront	Video streaming & speed	Delivers videos globally with low buffering and fast streaming speeds.
Amazon Elastic Transcoder / AWS MediaConvert	Video processing	Converts uploaded videos into formats that play smoothly on all devices.
AWS Lambda	Auto-processing tasks	Automatically triggers tasks like generating certificates after a student passes a quiz.
Amazon SES (Simple Email Service)	Email notifications	Sends notifications like “You earned a certificate!” or “New course available.”
Amazon DynamoDB / MongoDB Atlas	Fast database access	Stores all user data, scores, and progress.
AWS Cognito (Optional)	Authentication	Manages secure login and user sessions for students, instructors, and admins.
AWS Certificate Manager + CloudFront HTTPS	Security	Ensures all user data and video streams are encrypted (SSL).
AWS EC2 / Elastic Beanstalk / ECS	Application hosting	Runs the Node.js backend securely in the cloud.

How Video Streaming Works (Simple Flow)

1. Instructor uploads a course video → stored securely in **Amazon S3**.
2. **AWS MediaConvert** optimizes it for web and mobile.
3. **Amazon CloudFront** streams the video to students anywhere with minimal buffering.
4. Students can pause, resume, or watch full-screen — just like YouTube, but private and secure.