Software Design Specification

<Learning Management System>

Internal Advisor:

- ➢ **Project Supervisor / Faculty Member**
- ➢ **Head of Computer Science / IT Department**
- ➢ **Academic Mentor**
- ➢ **Lab Instructor (if practical sessions involved)**

External Advisor:

- ➢ **Industry Professional in E-Learning / LMS Development**
- ➢ **Software Engineer / Developer with experience in web applications**
- ➢ **IT Consultant specializing in educational systems**
- ➢ **Educational Technology Expert**

Project Team:

- ➢ **Tuba**
- ➢ **Emaan Fatima**
- ➢ **Ayesha Hassan**

Submission Date:

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Project Manager's Signature

Document Information

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Author(s)	Tuba,Emaan Fatima,Ayesha Hassan
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Definition of Terms, Acronyms and Abbreviations

Term	Description
SDS	Software Design Specification
UOS	University of Sargodha
LMS	Learning management systen

Table of Contents

1. Introduction

1.1 Purpose of Document

This paper present the design of our LMS. It helped the development team understand how each part of system will work and how all component will connect with each other.The design follows Object Oriented Design, Which makes the system easy to improve, maintain and explain in the future.

1.2 Project Overview

- An e-environment designed to assist in teaching and learning.
- Teacher can create course, upload study material, give assignments, check student performance.
- Student can join courses, download material, submit work and view results.
- The admin manage users, course approval and keep the system fluent.
- Our design idea is to keep the system easy to understand , simple to use and safe for all users.

1.3 Scope

LMS will provide:

- Login,user registration by all
- Course creation and enrollment
- Lecture material upload:PDF,videos and slides
- Assignment posting, submission and grading
- Announcement and Internal messaging
- Student progress and activity report

LMS will not provide:

- Physical class management
- Payment and fee related properties
- AI-powered personalized teaching tools

2. Design Considerations

The Learning Management System (LMS) is divided into three main layers:

User Interface, Business Logic, and Database.It includes modules for User Management, Course Management, Assignments & Assessments, Notifications, and Reporting & Analytic. Each module has sub-components, such as registration, course creation, submission, grading, and notifications.Modules interact to provide seamless functionality while ensuring security, scalability, and performance.The system is web-based, supports multiple devices, and includes error handling and backup mechanisms.

2.1 Assumptions and Dependencies

- User have internet access and basic devices like mobile and laptop.
- Teacher and student will know how to use standard website.
- The system relies on active database and email service for sending notification.

2.2 Risks and Volatile Areas

➢ Additional features can be ordered later, like live video classes.
➢ If too many users use system simultaneously, it has the tendency to slow down performance.
➢ Security issues may arise, and hence strong login and data protection is paramount.
➢ This will likely change in the future with technology or hosting platform.

3. System Architecture

The Learning Management System is divided into logical components that work together to support user roles, course activities, assessments, and reporting. The architecture ensures separation of concerns so that each part handles a specific responsibility while interacting with others efficiently.

3.1 System Level Architecture

Our system is divided into three main layers:
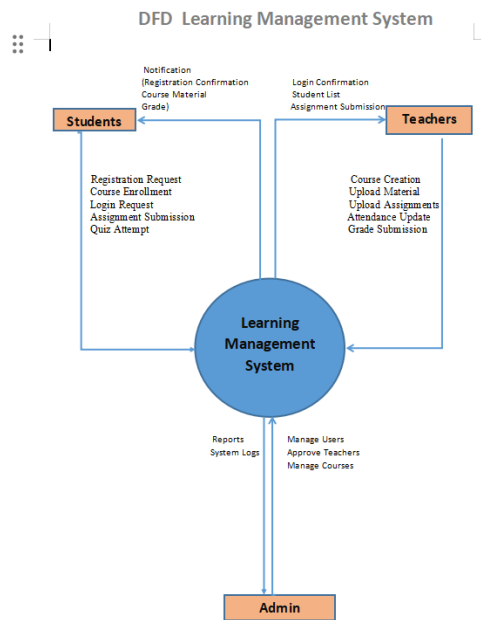
❖ Frontend /user interface

Page for logins, dashboard, courses and assignment etc.

❖ Backend/buisness Logic:

All the main work that consisted of creating courses, checking submissions and grading etc.

❖ Database layer:

Stores all information such as users ,courses,material,assignments and grades.
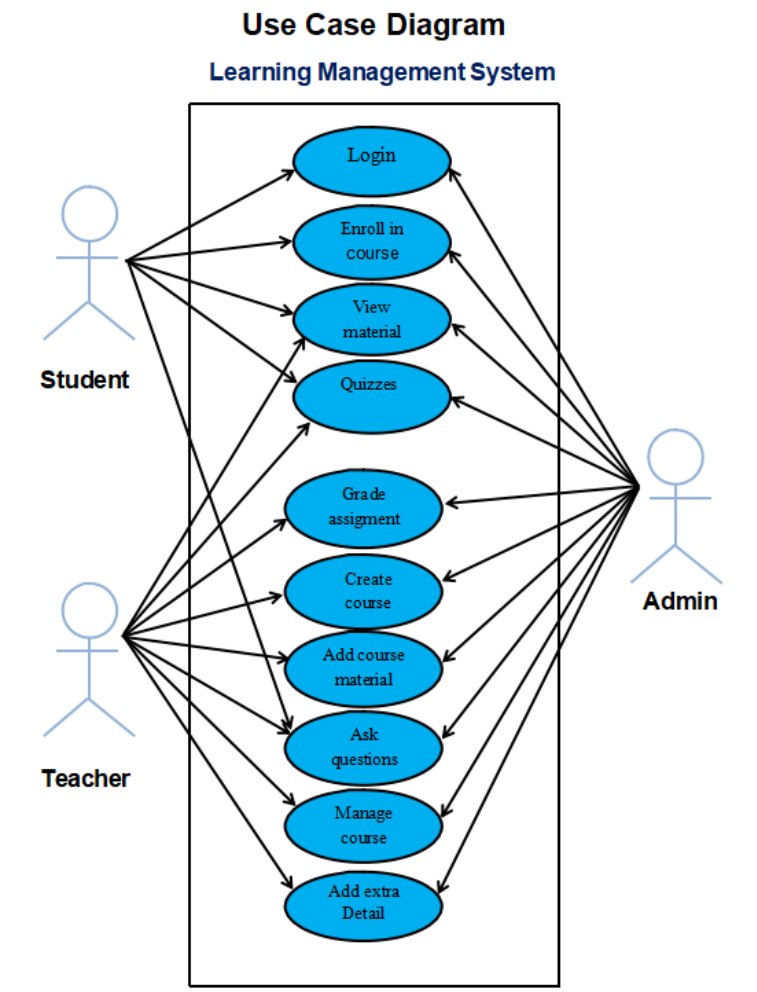

DFD Learning Management System

The detailed class diagram of learning management system explain how different classes such as teacher, student, admin, course, assignment and quiz are designed in system.It describe their attributes functions and the way these classes interact with each other to perform activities like course enrollment, assignment submission, grading and system management.

3.2 Sub-System / Component / Module Level Architecture

❖ Main system module:

➢ Authentication module = login, sign-up, logout
➢ Course module = create, edit, delete, approve course
➢ Material module = upload and download notes/videos
➢ Assignment module = Post assignment, submit work, grading
➢ Communication module = message and announcement
➢ Attendence module = mark and view attendence
➢ Admin module = user administration and control over the whole system
➢

Use Case Diagram
Learning Management System

This use case diagram explains the roles of students, teachers and admins in the learning management system.It shows how each user performs different actions like logging into system, managing courses, accessing learning material, attempting quizzes and submitting or assigning grades. The diagram helps to clearly understand what functions are available to each other.

3.3 Sub-Component / Sub-Module Level Architecture (1…n)

Each module contains further sub-units:

❖ **Authentication module:**

➢ Check user data
➢ Handle sessions
➢ Password management

❖ **Course module:**

➢ Add course
➢ Update course
➢ Approve course

❖ **Assignment module:**

➢ Upload assignment
➢ Submit assignment
➢ Give grades

4. Design Strategies

The LMS uses a modular and object-oriented design to keep the system scalable, maintainable, and easy to extend. The system separates interface, logic, and database layers, ensuring secure data storage and supporting multiple users at the same time with stable performance.

4.1 Strategies

❖ **Modularity:**

Every part will be separated so it will be easy to update r fix any part of the system in future.

❖ **Reusability:**

We reuse common features: log-in, messaging, file uploading and more between modules.

❖ **Security:**

Password will be stored in encrypted format. The type of user-student, teacher and administrator-determines the level of access.

❖ **Data Handling:**

All important important information will be stored in the database.

5. Detailed System Design

A detailed design should include the following:

Class Diagram:

➢ **User class:**
  User id, name, email, password, role, login() and logout().
➢ **Course class**
  Course id, title, description, teacher id, create course(), update course().
➢ **Material class**
  Material id, file path, upload, download()
➢ . **Assignment class**
  Assignment id, title, deadline, post Assignment(), submit Assignment().
➢ **Grade class**
  Student id, Assignment id, score, add grade(), view grade.
➢ **Announcement class**
  Message, date, post announcement
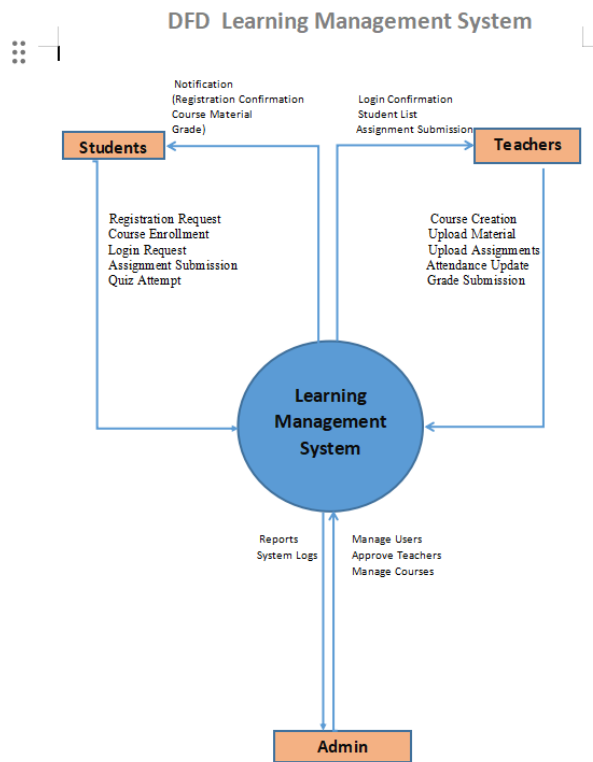
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Sequence:(*Example submit Assignment*)

- ✓   Student choose assignment
- ✓   System open upload page
- ✓   Student upload file
- ✓   System checking file
- ✓   File saved into database
- ✓   Teacher can view submission later
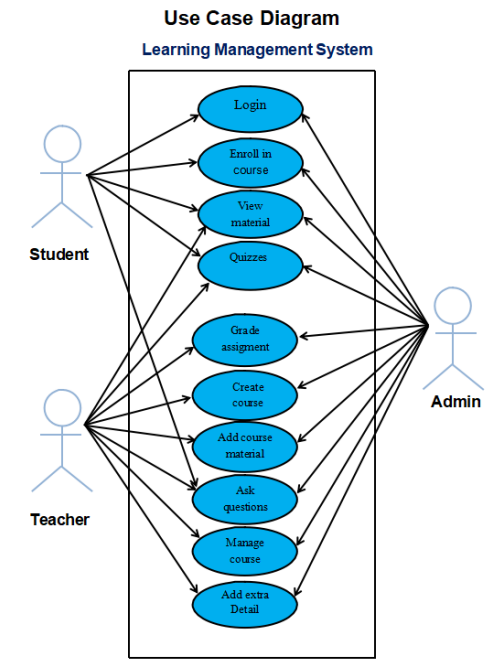
State Example:(*Assignment*)

Draft → Posted → Submitted → Graded

Logical ERD description:

Users, courses, material, Assignments, submission, grades, announcement and message.
Relationship:
 One teacher = many courses
 One course = many material
 One assignment= many submissions
 One student = many grades

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6. References

Ref. No.	Document Title	Date of Release/ Publication	Document Source
PGBH01-2025-Proposal	Use case diagram	Dec 14, 2025	https://github.com/dashboard
PGBH01-2025-FS	SRS Document	Dec 14, 2025	https://github.com/dashboardr
	Project proposal		