**AI-Powered Adaptive Online Learning Platform**

***Functional Requirements***

**1. User Management & Authentication**

* Students can **register and log in** using email, password, or Google authentication.
* Admin can **manage users** (approve, block, or delete accounts).
* Password **reset and account recovery** options will be available.

**2. AI-Based Personalized Learning Path**

* AI tracks students' **performance in quizzes** and **study time** to adjust content difficulty.
* AI suggests **topics for improvement** based on students' weak areas.
* Learning materials (videos, PDFs, articles) are **dynamically recommended**.

**3. AI-Generated Quizzes & Automated Answer Evaluation**

* AI creates quizzes based on **students' learning progress**.
* Quizzes contain **multiple-choice, true/false, and descriptive** questions.
* AI evaluates **descriptive answers** using NLP-based models.
* Instant **feedback and explanations** are provided.

**4. AI-Powered Study Recommendations**

* AI suggests **additional learning resources** like:
  + Video tutorials
  + PDFs and e-books
  + External courses (Udemy, Coursera, etc.)
* AI detects weak areas and **prioritizes improvement topics**.

**5. AI-Powered External Course Recommendations**

* The system integrates with **third-party platforms** (Udemy, Coursera, edX, etc.).
* AI **fetches relevant courses** based on students' weaknesses.
* Students get direct **links to free and paid courses**.

**6. Progress Tracking & Reports**

* AI generates **weekly reports** highlighting:
  + Accuracy in quizzes
  + Speed of answering
  + Strengths and weaknesses
* Reports **visualize student progress** through graphs and charts.

**7. Smart Adaptive Scheduling**

* AI detects **best study times** for each student.
* AI suggests **breaks and study schedules** based on performance.
* Example: If a student performs best at night, AI **recommends late-night study sessions**.

***Non-Functional Requirements***

**1. Performance & Speed**

* The system should generate **quizzes instantly** without delays.
* AI processing time should be **minimal**, ensuring real-time feedback.

**2. Security & Data Protection**

* User data should be **encrypted** to prevent leaks.
* Secure login using **OAuth (Google Sign-In)** for authentication.
* The system should have **anti-cheating mechanisms** (e.g., monitoring response times).

**3. Scalability**

* The platform should handle **students simultaneously**.
* AI models should scale based on user activity.

**4. Usability & User Experience**

* The UI should be **simple, clean, and easy to navigate**.
* Students should easily find their **quizzes, study materials, and reports**.

**5. Reliability & Availability**

* The system should **work 24/7** without downtime.
* AI should work even if **one module fails** (fault tolerance).

**6. AI Explainability & Transparency**

* AI should provide **reasons** for recommendations.
* Example: Instead of saying, "You need to study algebra," it should say,
  + "**Your algebra accuracy is 60%, below the required 75%. Focus on solving equations.**"