Software Requirements Specification (SRS)

For

Intelligent Peer Learning Platform

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CSE 3C

24, Sept 2025

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Software Requirements Specification (SRS)

**Intelligent Peer Learning Platform**

**1. Introduction**

**1.1 Purpose**

This document specifies the requirements for the Intelligent Peer Learning Platform (IPLP), which aims to provide a scalable, secure, and AI-powered online peer learning ecosystem. The platform enables personalized peer matching, AI-supported assistance, and real-time progress analytics, fostering an inclusive, interactive, and engaging learning community.

**1.2 Scope**

IPLP will support a diverse user base including students, educators, and administrators, offering features such as multimedia course content management, chat-enabled mentorship, AI-driven peer matching, predictive analytics, and role-based security. It targets learners worldwide and integrates modern web technologies (MERN stack) with machine learning models.

**1.3 Definitions, Acronyms, Abbreviations**

* MERN: MongoDB, Express.js, React.js, Node.js
* ML: Machine Learning
* NLP: Natural Language Processing
* JWT: JSON Web Tokens
* OAuth: Open Authorization
* CDN: Content Delivery Network

**2. Overall Description**

**2.1 Product Perspective**

IPLP is an independent web application built on a microservices architecture, containerized with Docker, and orchestrated with Kubernetes for scalability. It integrates AI inference endpoints and third-party authentication providers.

**2.2 Product Functions**

* User registration, login, and profile management.
* Course creation, editing, and multimedia content upload.
* Real-time chat interface for peer mentorship and AI chatbot interaction.
* AI-powered peer matching based on learning behaviour and profiles.
* Analytics dashboard for real-time tracking of progress and predictive alerts.
* Role-based access and administrative controls.

**2.3 User Characteristics**

Users include students (learners), teachers (mentors/content providers), and administrators.

**2.4 Constraints**

* Must comply with GDPR and data privacy regulations.
* Responsive design supporting desktop and mobile platforms.
* Cloud deployment with reliable uptime and security.

**3. Specific Requirements**

**3.1 Functional Requirements**

**3.1.1 User Management**

* Users can register/login using email or third-party (Google OAuth).
* Password encryption and two-factor authentication (2FA) offered.
* Role assignment: student, teacher, admin.

**3.1.2 Course Management**

* Teachers can create, update, delete, and organize course materials.
* Support uploading multimedia content (videos, documents, quizzes).
* Students can enroll, access materials, and submit assignments.

**3.1.3 Peer Matching**

* ML algorithms dynamically match learners with peers or mentors.
* Matching criteria includes skills, learning styles, past interactions.

**3.1.4 Communication**

* Real-time chat between peers and with AI assistants powered by NLP.
* Group discussions, private messages, and notifications supported.

**3.1.5 Analytics & Reporting**

* Dashboards showing progress metrics, engagement, and performance trends.
* Predictive alerts for at-risk learners sent to students and teachers.

**3.1.6 Security**

* Session management with JWT tokens.
* Secure API access with HTTPS.
* Role-based authorization controls.

**3.2 Non-Functional Requirements**

**3.2.1 Performance**

* System should handle concurrent users with minimal latency (<200ms response).

**3.2.2 Scalability**

* Support horizontal scaling with Kubernetes and cloud resources.

**3.2.3 Usability**

* Intuitive, accessible UI compliant with WCAG 2.1 standards.

**3.2.4 Reliability**

* 99.9% uptime, fault tolerance through container orchestration.

**3.2.5 Maintainability**

* Modular codebase with documentation and CI/CD pipelines.

**3.2.6 Security**

* Data encryption in transit and at rest.
* Compliance with GDPR and industry best practices.

**4. System Architecture Overview**

* React.js frontend communicates with Node.js/Express.js backend APIs.
* MongoDB Atlas as the primary data store.
* TensorFlow.js and Hugging Face models for AI/ML services.
* AWS S3 and CDN for multimedia content delivery.
* Docker for containerization and Kubernetes for orchestration.