

# AI-EduMate - Capstone Project Brochure

## Overview

AI-EduMate is a next-generation, AI-integrated Learning Management System that empowers students and instructors with automated course creation, dynamic content generation, AI-based tutoring, and personalized assessments. Designed as a full-stack application for educational enrichment, AI-EduMate harnesses modern data science principles, natural language generation (NLG), and software engineering to create a scalable, intelligent, and adaptive learning platform.

## System Architecture

ReactJS (Frontend) -> Axios -> FastAPI (Backend REST APIs) -> SQLAlchemy -> SQLite/PostgreSQL  
-> OpenAI GPT API (AI Integration)

## Workflow

1. User Registration & Roles
2. Course & Lesson Generation via GPT-4
3. Quiz & Flashcard Generation
4. AI Tutor Chatbot
5. Progress Tracking & Dashboard Visualization

## AI & Data Science Integration

The platform uses OpenAI's GPT-4 for content generation, summarization, quiz creation, and tutoring. NLP prompt engineering and modular prompt templates enable context-specific outputs.

## Backend Architecture

FastAPI with SQLAlchemy ORM, JWT authentication, async endpoints, OpenAI integration, and modular route definitions.

## Database Schema

User Course Module Lesson LessonContent, Quiz, Flashcard  
User ChatHistory

## Frontend Features

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ReactJS components with routing, protected views, and Axios-based API communication. Includes Dashboard, Course, Lesson, Quiz, Flashcard, AI Tutor, etc.

## Deployment

Frontend on Vercel/Netlify, Backend on Render/Railway, PostgreSQL on Supabase/Railway, secrets managed via .env files.

## Future Extensions

1. Adaptive learning path
2. LangChain tutor
3. Analytics dashboards
4. Mobile App