EduMate AI Agent – Requirement Specification

Project Overview

EduMate AI is a **personalized AI-powered study companion** built to guide students throughout their academic journey. The agent helps them manage study plans, track academic progress, prepare for exams, and stay motivated. Powered by **Generative AI** and **Agentic AI**, it evolves with each student's learning style, goals, and challenges to deliver a unique support system.

Primary Objectives

- Provide personalized academic guidance and planning
- Improve time management, focus, and learning consistency
- Offer content summarization and study material generation
- Enable continuous progress tracking and motivation
- Act as a 24/7 study partner, tutor, planner, and well-being assistant

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Key Features by Functional Category

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1. 🗓️ Smart Study Planner

- Create dynamic daily/weekly/monthly study schedules based on:
  - Class hours
  - Exam dates
  - Student learning speed
  - Priority subjects
- Auto-adjust plan based on missed goals or unexpected changes
- Notify students of overdue tasks and upcoming tests

Tech: LangGraph + agent memory for time-based adaptation

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2. 📘 Personalized Roadmap Generator

- Generates semester-wise academic roadmap tailored to:
  - Degree program

    - Subject credits
    - Targeted GPA
    - Career goals (e.g., preparing for placements, GATE, GRE)
- Visual dashboards to track roadmap completion

Tech: Generative AI prompt planner + milestone tracker module

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3. 📚 AI Tutor & Explainer Bot

- Explains complex concepts in simple terms using:
    - Examples
    - Diagrams
    - Step-by-step breakdowns
- Supports subjects like Math, Programming, Physics, etc.
- Available via chat, voice, or even sketch-based prompts

Tech: GPT-4, Claude, multimodal models for diagrams/explanations

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4. ✍️ Notes & Flashcard Generator

- Summarizes uploaded PDFs, slides, or textbooks into:
    - Bullet-point notes
    - Flashcards with key terms
    - Highlighted formulas or definitions
- Exports to PDF, Anki, or mobile-friendly view

Tech: PDF parsers + GPT + Hugging Face Transformers

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5. 📖 Content Recommender Engine

- Recommends:
    - YouTube videos, playlists
    - Blogs, podcasts, lecture slides
    - Topic-wise reading suggestions
- Filters based on subject, difficulty level, and personal preference

Tech: Retrieval Augmented Generation (RAG), FAISS/Chroma

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6. 🔍 Progress Tracker & Analytics

- Tracks:
  - Completed topics
  - Time spent per subject
  - Quiz scores
- Offers visual analytics (charts, heatmaps) and weekly reports
- Suggests adjustments in study plan based on progress

Tech: User data logs + chart generator + agent planner loop

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7. 💬 Daily Motivation & Focus Prompter

- Sends:
  - Motivational quotes
  - Study affirmations
  - Productivity tips
- Detects burnout signs and recommends breaks or wellness exercises

Tech: Prompt scheduling agent + sentiment detection

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8. 📑 Assignment & Exam Assistant

- Helps:
  - Break down assignments into doable tasks
  - Set reminders for deadlines
  - Generate practice questions or mock tests
- Option to simulate viva questions based on assignment topics

Tech: GPT-based task splitter + quiz generator

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9. 🧠 AI-Powered Peer Study Match (Optional Add-on)

- Matches students with similar learning goals or subjects
- Suggests ideal study partners or group project members
- Includes safe chat with academic goal focus

Tech: Matchmaking logic + interest clustering

🛠️ Technology Stack

Category	Tools/Frameworks
LLMs	OpenAI GPT-4, Claude, Mistral
Agentic AI	LangChain, LangGraph, CrewAI
Task Scheduling	TaskWeaver / LangChain planner
Retrieval	Chroma / FAISS (for RAG content)
Frontend	React or Flutter (for web/mobile UI)
Backend	FastAPI or Node.js
File Handling	PyMuPDF / PDFMiner / docx
Analytics	Chart.js / Plotly / Matplotlib
Deployment	Streamlit / Hugging Face / Azure
Notifications	Email / Push / WhatsApp APIs

🧩 Sample User Scenarios

Scenario	How EduMate Helps
Missed 2 days of study	Reschedules plan and reprioritizes topics
Feeling unmotivated	Sends a motivational quote and quick win tip
Can't understand DSA topic	Explains with flowchart and real-world analogy
Exam in 3 days	Activates revision mode + mock quiz
Wants to prepare for placements	Suggests resume-building, aptitude prep, and interview topics
Overloaded schedule	Suggests focus strategy and smart timeboxing

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💬 Sample Prompts Students Can Use

- “Create a weekly plan to cover all subjects with 2 hours per day.”
- “Explain the difference between supervised and unsupervised learning.”
- “Summarize Unit 2 of Operating Systems into flashcards.”
- “Remind me to review DBMS every Friday.”
- “Give me a 10-minute quiz on C programming.”
- “I’m feeling demotivated. Give me a study hack.”

🔁 Agentic AI Flow Example

1. **Input**: “Help me plan my week. I have exams in 10 days.”
2. **Agent Goals**:
    - Identify subjects and topics pending
    - Allocate time slots with urgency scaling
    - Add revision day before exams
3. **Agent Output**:
    - Visual study timetable
    - Daily reminders
    - End-of-day revision prompt

🔐 Security & Ethics

- All data stored locally or with user consent
- No sensitive personal info tracked
- Encourages **growth mindset**, not perfectionism
- Wellness-first approach (includes break planning)

What Students Can Start Building Now (Pre-GenAI Skills)

Since students have already learned Python, ML/DL, and built mini-projects, here are **starter modules** they can implement right away:

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1. 🗓️ Smart Study Planner (Rule-Based)

Goal: Create a dynamic daily/weekly planner

- Input: Class hours, available time, subjects, exam date
- Output: JSON-based schedule (subject → time slot)
- Option to shift missed tasks to next day

💡 *Tech Stack:* Python, conditionals, datetime, file handling, Pandas

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2. 📘 Personalized Academic Roadmap (Static)

Goal: Build static semester roadmaps

- Inputs: Program type, semester, subject credits
- Output: Weekly roadmap (topic vs. week)
- Store & update plan using CSV or JSON

💡 *Tech Stack:* Python, data structures, visualization with Matplotlib

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3. 📚 Topic Explainer Bot (Simple Logic-Based)

Goal: Create a structured content viewer

- User selects a subject & topic
- Script displays structured text/notes with examples

💡 *Tech Stack:* Python, structured notes DB (JSON/CSV), basic file reader

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4. ✍️ PDF Notes Extractor & Summarizer (Prototype)

Goal: Convert uploaded PDFs to editable notes

- Extract headings and bullet points from a study PDF
- Convert to structured format or export as summary.txt

💡 *Tech Stack:* `PyMuPDF`, `pdfminer`, basic string parsing

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5. 📊 Study Progress Tracker

Goal: Visualize what's done and what's pending

- Input: Subjects and completed topics
- Output: Pie chart or heatmap showing coverage

💡 *Tech Stack:* Pandas + Matplotlib / Plotly

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6. 📑 Assignment Manager

Goal: Track assignments, deadlines, and task splits

- Students input assignments & due dates
- Suggest daily chunks to complete
- Notify of missed progress

💡 *Tech Stack:* Python scheduler, date/time logic

Post-GenAI Learning (Advanced Build Phase)

Once students are introduced to **Generative AI and Agentic AI** (LangChain, GPT-4), they can expand the project with smart automation and personalization:

✅ Feature Enhancements with GenAI

Feature	AI-Powered Upgrade
Study Planner	Use GPT to auto-generate study schedule from free-form prompt: *"I have 3 hours/day and exams in 12 days"*
Concept Explainer	Input: "Explain DSA" → Output: GPT explains with analogy + diagrams
Flashcard Generator	Auto-create Anki-style flashcards from uploaded textbook or PDF
Motivation Engine	Detect burnout from user inputs and suggest personalized hacks using sentiment detection
Quiz Generator	Generate MCQs from topic name using GPT and tag Bloom's level
Peer Match	Use clustering to suggest study buddies with matching schedules/interests

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🛠 Suggested Folder Structure (Student Version)

```
edumate_ai/
│
├── data/
│   ├── roadmap_templates/
│   ├── subject_topics.csv
│   ├── assignment_tracker.json
│   └── flashcard_data/
│
├── src/
│   ├── study_planner.py
│   ├── roadmap_generator.py
│   ├── content_explainer.py
│   ├── notes_extractor.py
│   ├── progress_tracker.py
│   └── quiz_creator.py
```

```
├── ui/
│   └── streamlit_app.py
├── models/ (for LLM workflows later)
├── docs/
│   └── examples, templates
└── requirements.txt
```

Sample Prompts for Future Agent

- "Create a 2-week study plan for Python and DSA"
- "Explain the difference between supervised and unsupervised learning with a flowchart"
- "Give me 5 MCQs on Operating Systems – Unit 2"
- "I'm feeling demotivated. Give me something to boost focus."
- "Show me how much I've covered in DBMS this semester"

AI Workflow Example (Agentic AI)

Input:

"Help me plan my revision. I have exams in 8 days."

Agent Flow:

1. Identify subjects + topics left
2. Allocate time using urgency scaling
3. Add a 1-day buffer
4. Return visual timetable + revision checklist

Tech: LangGraph planning node + GPT-4 for time optimization

Ethics, Safety, and UX Guidelines

- No sensitive student data stored unless permissioned
- All AI suggestions presented with a "verify before use" prompt
- Encourages personalized learning without academic pressure
- Daily breaks and wellness suggestions integrated