**Design and implement a College Academic Database and building an AI-powered assistant using LangChain + LLaMA 3 via Ollama to help users query the database using natural language. The assistant should convert user questions into valid SQL queries using the schema and return meaningful academic insights.**

**Objective**

* **Design and implement relational tables** for a college academic system with appropriate relationships and foreign key constraints to model real-world entities like students, professors, courses, grades, and attendance.
* **Insert the provided sample data** into the database to simulate realistic academic records.
* **Enable natural language querying** by integrating a Large Language Model (LLaMA 3 via Ollama) using the LangChain framework.
* **Use the LLM to automatically convert natural language questions into SQL queries**, based on the schema provided, without requiring SQL knowledge from the end user.
* **Extract meaningful academic insights** by executing the AI-generated SQL queries on the database and displaying relevant results.

**Tables and Relationships**

You must create the following tables:

| **Table Name** | **Description** |
| --- | --- |
| students | Student details |
| professors | Professor details |
| courses | Courses offered and professor teaching |
| grades | Grades of students in courses |
| attendance | Attendance records of students |

**Database Relationships**

professors (id) 1 --- teaches --- \* courses (professor\_id)

students (id) 1 --- enrolls\_in --- \* grades (student\_id)

courses (id) 1 --- includes --- \* grades (course\_id)

students (id) 1 --- attends --- \* attendance (student\_id)

courses (id) 1 --- has --- \* attendance (course\_id)

**Or shown as foreign key dependencies:**

professors (id) <-- courses (professor\_id)

students (id) <-- grades (student\_id)

courses (id) <-- grades (course\_id)

students (id) <-- attendance (student\_id)

courses (id) <-- attendance (course\_id)

**Sample Data to Insert**

You will be provided with sample data for each table to insert after table creation.

**Tasks**

1. **Create tables** with columns and appropriate foreign keys as per the ER diagram.
2. **Insert sample data** into the tables
3. **AI Integration (LLaMA-Ollama)**

* Use the langchain\_ollama.ChatOllama model with a prompt template that:
* Accepts a **natural language question**
* Provides the **schema as context**
* Outputs a **valid SQL query only**, without explanation

1. **Sample User Queries**

* "List all 3rd-year students from Computer Science."
* "Who teaches Operating Systems?"
* "Show the grades of student CS1001."
* "What is the attendance percentage of Yogesh Tale in Data Structures?"
* "Find students who scored an A in Algorithms."