# Route Plan:

1. **Project Scope and Requirements Gathering:**

- Define the scope of the project, including all the features mentioned.

- Collect detailed requirements from stakeholders (university officials, teachers, and students).

2. **System Design:**

- Create a database schema for storing staff and timetable-related data.

- Design the overall system architecture.

- Define the interfaces for the chatbot and the timetable generator.

3. **Database Setup:**

- Implement the database using a suitable relational database management system (e.g., MySQL, PostgreSQL).

4. **Chatbot Integration:**

- Choose a suitable chatbot framework (e.g., Dialogflow, Microsoft Bot Framework).

- Integrate the chatbot with WhatsApp using the WhatsApp Business API or a third-party service.

5. **Timetable Generator Algorithm:**

- Develop an algorithm to generate timetables considering all specified constraints.

- Use techniques such as Genetic Algorithms, Constraint Satisfaction Problem (CSP), or Linear Programming.

6. **Notification System:**

- Implement a notification system for teachers and students using WhatsApp APIs.

- Define rules for automatic notifications and alerts.

7. **User Interfaces:**

- Design user interfaces for both the admin (for setting constraints, viewing timetables) and users (teachers, students) interacting with the chatbot.

8. **Integration Testing:**

- Test the integration of the chatbot, timetable generator, and notification system.

9. **Deployment:**

- Deploy the system on a server with proper security measures.

10. **User Training and Documentation:**

- Prepare user manuals and documentation for end-users and administrators.

- Conduct training sessions for staff and students.

# Technical Requirements:

- **Programming Languages:** Python, JavaScript (for chatbot integration)

- **Database**: MySQL or PostgreSQL

- **Chatbot Framework:** Dialogflow, Microsoft Bot Framework

- **Web Framework:** Flask or Django (for web-based interfaces)

- **WhatsApp API:** WhatsApp Business API or third-party service with WhatsApp integration

# Algorithms to Follow:

- **Timetable Generation:**

- Genetic Algorithms, Constraint Satisfaction Problem (CSP), or Linear Programming.

### Challenges:

- \*Complex Constraints:\*

- Managing and optimizing the timetable with various constraints can be challenging.

- \*Real-time Integration:\*

- Ensuring real-time updates and notifications within the chatbot.

- \*User Adoption:\*

- Users (teachers and students) might face challenges adapting to the new system.

# Timeline:

1. **Project Planning and Requirements Gathering:** 1 month

2. **System Design and Database Setup:** 2 months

3. **Chatbot Integration:** 2 months

4. **Timetable Generator Algorithm:** 3 months

5. **Notification System:** 1.5 months

6. **User Interfaces:** 2 months

7. **Integration Testing:** 1 month

8. **Deployment:** 1 month

9. **User Training and Documentation:** 1 month

# Conclusion:

This timeline is just a guideline, and you may need to adjust it based on your team's skills, resources, and unforeseen challenges. Regular meetings with your project advisor and stakeholders are crucial for feedback and adjustments. Additionally, consider breaking down tasks into smaller sprints for better management and flexibility. Good luck with your project!