**Phase 1: Data Collection & Preprocessing (Weeks 2-5)**

**Week 2 - Initial Setup & API Acquisition**

* GitHub Repository & Environment Setup
* API Key Acquisition:
  + Google Maps API (Traffic, Places)
  + OpenWeatherMap API (Weather & Air Quality)
  + OpenStreetMap API (Zoning & Roads)
  + Sentinel Hub (Satellite & Vegetation Data)
* Download Static Datasets (Zoning, Historical Traffic, Climate, Green Spaces)
* Submit Week 2 Documentation (CSCI 6883 Project Questionnaire)

**Week 3 - Data Collection & Database Setup**

* Fetch Real-Time Traffic Data (Google Maps API)
* Download Land Use & Zoning Data (OpenStreetMap, Municipal Data)
* Collect Environmental Data (Air Quality, Green Spaces, Climate)
* Database Schema Design & Implementation (SQLite/MongoDB)

**Week 4 - Data Cleaning & Feature Engineering**

* Preprocess Traffic & Land Use Data
* Extract Geospatial Features (Roads, Pollution, Vegetation Index)
* Exploratory Data Analysis (EDA) on the collected datasets

**Week 5 - Finalizing Dataset for Model Training**

* Feature Engineering & Data Transformation
* Train-Test Split & Dataset Preparation

**Phase 2: AI Model Development (Weeks 6-10)**

**Week 6 - Land-Use Prediction Model**

* Train Initial Model (Random Forest / Decision Trees)
* Predict Residential, Commercial, Industrial Zones

**Week 7 - Traffic Congestion Prediction Model**

* Model Traffic Flow Based on Historical Data
* Predict Congested vs. Free-Flowing Areas

**Week 8 - Environmental Impact Analysis Model**

* Predict Air Pollution, Green Coverage Deficiency
* Flood Risk Analysis Using Elevation & Rainfall Data

**Week 9 - Model Optimization & Performance Evaluation**

* Hyperparameter Tuning (Grid Search, Random Search)
* Evaluate Accuracy (F1-score, RMSE, Precision-Recall Curves)

**Week 10 - AI-Powered Urban Planning Insights**

* Integrate Traffic, Zoning, and Environmental Predictions
* Generate AI-Driven Planning Recommendations

**Phase 3: Visualization & Deployment (Weeks 11-16)**

**Week 11 - Map Visualization Setup (Leaflet.js)**

* Create 2D Interactive Maps

**Week 12 - AI Model Integration with Maps**

* Overlay Predicted Land Use, Traffic, and Environmental Data on Maps

**Week 13 - UI Development & User Features**

* Users Can Set Constraints (e.g., Low Pollution Zones, Noise-Free Areas)
* Authentication System (User Login/Register)

**Week 14 - Testing & Debugging**

* Fix Bugs & Performance Issues

**Week 15 - Deployment & Documentation**

* Deploy the Application
* Complete Final Project Documentation

**Week 16 - Final Review & Submission**

* Last-Minute Fixes & Report Submission