perplexity

ready-to-build, distinction-level project plan for

 "Impact of Weather Conditions on Air Pollution Levels in London"

Here is a distinction-level project plan for "Impact of Weather Conditions on Air Pollution Levels in London," directly mapped to your assignment marking criteria and module outcomes. [1]

Project Title

Impact of Weather Conditions on Air Pollution Levels in London

Step-by-Step Project Plan

1. Introduction, Context & Data Collection

- Outline why air pollution is a critical issue in London, referencing local health, policy, and climate research. [1]

- Research questions: How do weather factors (temperature, humidity, wind speed, rainfall) influence key pollutants (e.g. NO2, PM2.5, PM10, O3)? Are there seasonal or spatial trends?

- Data sources:

    - London Air Quality Network (hourly/daily pollutant and weather data) [2] [3]

    - DEFRA Open Data (modelled pollution and meteorology) [4]

    - Kaggle/GitHub for pre-aggregated, cleaned datasets if needed [5] [6]

- Document dataset characteristics, variables, time frame, and extraction method in notebook/code cells. [1]

2. Preparation & Exploratory Data Analysis (EDA)

- Clean and transform data (handle missing values, align timestamps, derive relevant weather features).

- Exploratory visualizations:

    - Time series plots for pollutant levels and weather variables.

    - Correlation/heatmaps: Assess relationships between weather and pollutants.

    - Spatial visualizations (optional): Borough or site-level pollution mapping. [2] [5]

- Descriptive statistics: Mean, median, std dev, outliers for all variables.

3. Advanced Analysis & Modeling

- Statistical hypothesis: E.g. "Increased wind speed is associated with lower NO2 concentrations."
- Apply relevant statistical/computational methods:
  - Pearson/Spearman correlation analysis.
  - Linear regression or time-lagged regression models.
  - If appropriate, use clustering (e.g. KMeans on pollution patterns).
- Visualize model outputs and interpret coefficients for real-world meaning.

4. Evaluation & Data Story

- Critical discussion of findings in 1000-word report:
  - Summarize key impacts—e.g., does rainfall reduce particular pollutants, do heatwaves spike PM, etc.
  - Compare with published studies for context and credibility (cite Harvard-style).[1]
  - Discuss data limitations (missing values, station coverage, measurement noise).
  - Explain implications for health, public policy, or further research.
- Suggest practical recommendations (e.g., better urban planning, health advisories under certain weather conditions).

5. Submission & Presentation

- Notebook: Use clear markdown cells for commentary, separate code cells for each analysis stage.
- Include code, visualization outputs, and summary findings.
- Ensure your notebook, PDF, or Word report follows submission guidelines and includes full referencing.[1]

Why This Plan Achieves Distinction

- Addresses all core marking criteria by integrating data science methods, programming (Python/pandas/matplotlib/seaborn), and contextual evaluation.[1]
- Builds a compelling narrative supported with rich analysis and professional visualizations.
- Uses authentic, local datasets for originality and practical relevance.
- Demonstrates autonomy, depth, and critical reasoning in evaluating outcomes and limitations—key to top grading bands.[2] [1]

This plan sets you up for full marks (80%+) if executed with clarity, rigor, and critical insight using the referenced datasets and techniques.

❄

1. COM7064-CW1-Assignment-Brief-2025-26.pdf
2. https://www.londonair.org.uk/london/asp/datadownload.asp
3. https://www.londonair.org.uk
4. https://uk-air.defra.gov.uk/data/pcm-data
5. https://www.kaggle.com/datasets/thedevastator/air-pollution-health-impacts-in-london-boroughs
6. https://github.com/datasets/london-air-quality