**Project proposal:**

evaluation criteria:

* objectives and background (25%)
* problem statement (20%)
* business questions (20%)
* methodology (30%)
* table of contents and References (5%).

**What Must Be Considered in the Proposal?**

The following points must be considered in every proposal:

* Title page (Proposal and Project Report):
  + Name of the university, department, and the chair
  + The provisional title of the Project Report
  + Author: surname, family name, matriculation number, postal and e-mail address
  + Examiners
  + Place and date
* Background and motivation of the Project Report (why to write a work about this topic?)
* Problem statement and research questions (3 to 5). Each research question has to be specified, why the research question is relevant, and how a research question will be answered (i.e., using which research methods, e.g., discussion of the literature, case studies, or an empirical study). Recommendation: Define them in Objective-Key-Results format with measurable metrics.
* Data Sources: Briefly description of the data sources
* Objectives and output of the Project Report (what must be achieved within the work?)
* Addressee (who is supposed to use the results of the work?)
* Proceeding and method (which research methods are used?)
* Time schedule (~5 milestones; sub-goals, activities, steps)
* Contents (provisional table of contents with two hierarchical levels)
* Literature (at least ten sources)

## Draft

**Table of Contents and References (5%)**

- Introduction

- Literature Review

- Methodology

- Data Analysis

- Findings and Discussion

- Conclusion and Recommendations

- References

**Data Sources:**

- NASA's InSight: Mars Weather Service API

- Earth weather databases (Mapbox or NOAA's National Weather Service)

**Time Schedule:**

1. Literature Review and Data Source Exploration: Weeks 1-3

2. Data Collection and Integration: Weeks 4-6

3. Data Analysis: Weeks 7-9

4. Drafting Findings and Discussion: Weeks 10-12

5. Final Review and Submission: Week 13

**Background and Objectives**

This project aims to leverage data warehouse and data lake systems to analyze and compare weather patterns from Earth and Mars. With global warming being a pivotal concern for Earth's future, understanding extraterrestrial climates, particularly Mars, can provide new insights into our own planetary weather changes and sustainability. NASA's InSight: Mars Weather Service API presents a unique opportunity to study Martian weather, offering daily weather reports from Elysium Planitia, Mars.

**Objectives:**

- To establish a comprehensive data warehouse system integrating NASA's Mars weather data with Earth's weather datasets.

- To analyze and compare temperature trends, atmospheric conditions, and other relevant weather parameters between Earth and Mars.

- To assess the viability of Mars as a habitat for future human colonization in the context of global warming.

**Problem Statement (20%)**

Despite the growing body of research on global warming, most studies are confined to Earth, with limited understanding of extraterrestrial climates. This project addresses the gap by analyzing Martian weather patterns in relation to Earth's, exploring whether Mars could serve as a potential habitat as Earth faces escalating climate change challenges.

**Business Questions (20%)**

1. How do the temperature variations on Mars compare with Earth's over comparable time periods?

2. What insights can Martian atmospheric conditions provide about Earth's future weather patterns and global warming trends?

3. Can data-driven analysis of Martian weather predict the viability of human life on Mars?

**Methodology (30%)**

This project will employ a comparative data analysis approach, integrating data from NASA's InSight Mars Weather Service API and Earth weather databases.

Key steps include:

- Data Collection: Extracting weather data from the respective APIs and databases.

- Data Integration: Consolidating Martian and Earth weather data into a unified data warehouse.

- Data Analysis: Using visualization, statistical and machine learning techniques to compare weather patterns and identify trends.

- Interpretation: Assessing the implications of Martian weather data for global warming and potential human colonization.

**Literature:**

**1. Data:**

* **NASA Mars Weather Service API Documentation:** [https://api.nasa.gov/assets/insight/InSight%20Weather%20API%20Documentation.pdf](https://api.nasa.gov/assets/insight/InSight%20Weather%20API%20Documentation.pdf" \t "_blank)
* **Earth Weather Data Sources:**
  + **Mapbox Weather API:** [https://www.mapbox.com/weather](https://www.mapbox.com/weather" \t "_blank)
  + **NOAA National Weather Service (NWS) API:** [https://www.weather.gov/documentation/services-web-api](https://www.weather.gov/documentation/services-web-api" \t "_blank)
* **Data Warehousing and Lake Systems:**
  + TODO

**2. Comparative Planetary Climatology:**

* Modeling the martian atmosphere with the LMD global climate model <https://www.researchgate.net/publication/42798521_Modeling_the_martian_atmosphere_with_the_LMD_global_climate_model>
* Richardson, M. I., & Mischna, M. A. (2005). How warm was Mars? A review of the evidence. **Journal of Geophysical Research: Planets**, 110(E12). [https://www.lpi.usra.edu/planetary\_news/2016/07/07/agu-2016-session-p030-the-early-mars-environment-warm-and-wet-cold-and-wet-or-cold-and-icy-2/](https://www.lpi.usra.edu/planetary_news/2016/07/07/agu-2016-session-p030-the-early-mars-environment-warm-and-wet-cold-and-wet-or-cold-and-icy-2/" \t "_blank)
* Jakosky, B. M., & Phillips, R. J. (2001). Mars: The red planet. Oxford University Press.

**3. Martian Habitation and Global Warming:**

* McKay, C. P. (1996). The search for life on Mars. **Advances in Space Research**, 18(11-12), 11-23. <https://link.springer.com/chapter/10.1007/978-94-015-8907-9_14>
* Cabrol, E., & Grin, E. A. (2010). The lakes of Mars. **Science**, 327(5971), 1122-1123. <https://www.sciencedirect.com/book/9780444528544/lakes-on-mars>
* Challenges to the Sustainability of Space Exploration <https://www.researchgate.net/publication/248947457_Challenges_to_the_Sustainability_of_Space_Exploration>

**Additional Resources:**

* NASA Mars Exploration Program: <https://mars.nasa.gov/>
* European Space Agency (ESA) Mars: <https://www.esa.int/Science_Exploration/Human_and_Robotic_Exploration/Exploration/Mars>