

Project Proposal

Course Project Component #2 (worth 5%; deadline: Friday, October 11 at 11:59pm)

Certificate of Work (5 Marks)

Complete the *Certificate of Work* that can be found in the “Lab Report Template” uploaded on D2L.

Project Objectives (10 Marks)

Write an introduction that provides a clear and concise explanation of the engineering problem your project aims to solve. Include the following points:

- **Existing Solutions and Gaps:** Provide an overview of current methods or approaches being used to solve the problem and identify any gaps or limitations your project will aim to address. Be sure to include references to relevant literature and sources to support your discussion.
- **Relevance to Engineering:** Explain why this problem is significant and how your project will contribute to the field of engineering.
- **Project Statement:** Summarize your approach in a single, clear sentence that describes how your project will solve the identified problem.

Project Timeline (5 Marks)

Provide a brief project timeline, broken down into specific tasks and indicate expected completion dates for each phase of the project.

Submission Materials

Submit your Certificate of Work and Introduction as a single .pdf file to the “Project Proposal” dropbox on D2L. Additionally:

- For detailed grading criteria, refer to the sheet on the next page.
- For additional guidelines on presentation and final project submission, see the Appendix.

Grading Criteria

1. Certificate of Work (5 marks)

Criteria	Marks
Completed correctly and submitted as part of the report	5
Not completed or missing entirely	0

2. Project Objectives (10 marks)

Criteria		Marks
Existing Solutions and Gaps:	Provides a thorough overview of current methods, clearly identifies gaps or limitations, and includes multiple relevant literature references.	4
	Offers a solid overview of current methods and identifies some gaps, with at least one relevant literature reference.	3
	Provides a basic overview of current methods but lacks clarity on gaps or limitations; may have minimal literature references.	2
	Mention of current methods is vague or incomplete; no gaps identified and lacks literature references.	1
	No overview of existing solutions or gaps provided.	0
Relevance to Engineering:	Clearly articulates the importance of the problem and how the project contributes significantly to the field of engineering.	4
	Explains the problem's significance but may not fully articulate the project's contribution or relevance.	3
	Provides a basic explanation of the problem's relevance but lacks depth or clarity regarding its contribution to the field.	2
	Vague explanation of the problem's significance, with little to no mention of its relevance to engineering.	1
	No discussion of the problem's relevance to engineering provided.	0
Project Statement:	Provides a clear, concise, and compelling summary of the project's solution in one sentence.	2
	Offers a vague or overly complex summary that lacks clarity or fails to capture the essence of the project's solution.	1
	No project statement provided.	0

3. Project Timeline (5 marks)

Criteria		Marks
Existing Solutions and Gaps:	Comprehensive timeline with all tasks clearly defined, logical sequencing, and realistic, achievable deadlines for each phase.	5

	Some tasks are defined, but the timeline lacks detail, contains vague descriptions, or includes unrealistic deadlines.	3
	Timeline is missing significant details, with few or no tasks clearly outlined, or dates are not provided.	0

Appendix – Guidelines for the Presentation and Final Project Report Submission

Dataset and Machine Learning Model

In the **Methodology** section, provide a detailed breakdown of your approach:

Dataset Description

- Source, format, size, and key attributes of the dataset.
- Identify which columns/features will be used for training the machine learning model.
- Specify the column or metric that will serve as the “ground truth” for evaluating model performance.

Model Selection, Justification, and Validation

- Explain which machine learning model(s) you plan to use and why they are suitable for your problem.
- Discuss potential challenges or limitations that may arise when using the selected model(s).
- Discuss any techniques you will use to validate the model’s performance (e.g., train-test split, cross-validation), and provide a rationale.

Preprocessing

- Describe any data cleaning and preparation steps that will be applied (e.g., handling missing values, normalization, feature engineering).
- Clearly state which Python libraries will be utilized for preprocessing (e.g., Pandas, NumPy, Scikit-learn).

Results

In the **Results** section, effectively present and visualize how your model performed:

- Present the final performance of the model(s) based on the selected evaluation metrics (e.g., accuracy, precision, recall, or MSE). Explain how the performance of the models will be evaluated, and what specific metrics (e.g., accuracy, precision, recall for classification; mean squared error, R^2 for regression) mean in the context of your project.
- If you experimented with multiple models, compare their performance and discuss the trade-offs (e.g., model complexity vs. accuracy).
- Include relevant visualizations, such as confusion matrices for classification, error plots for regression, or ROC curves for evaluating performance. Use graphs or tables to support your findings.

Analysis

In the **Discussion** section, explain the rationale behind your model(s)' performance:

- Discuss any shortcomings in your model's performance (e.g., areas where the model misclassified data or performed poorly).
- Identify potential reasons for these shortcomings, such as data quality issues, model limitations, or the impact of specific features.
- Suggest any potential improvements for future iterations of your model (e.g., tuning hyperparameters, collecting more data, or testing different algorithms).

Conclusion

In the **Conclusion** section of your report, summarize your findings and reflect on the overall success of your project:

- Recap the key results from your analysis, including how well your model performed relative to the problem it aimed to solve.
- Discuss the broader implications of your findings for the field of engineering and whether your approach successfully addressed the gaps identified in existing solutions.
- Acknowledge any limitations in your approach, whether related to the dataset, model choice, or evaluation methodology. Provide suggestions for future research or next steps that could improve the performance of the model or expand its application.