Project Title: Algorithm Design and Implementation

Project Overview

The goal of this project is to provide students with hands-on experience in designing, implementing, and analyzing algorithms. Students will work in teams to develop solutions to a specified problem, enhancing their understanding of algorithmic principles, complexity analysis, and optimization techniques.

Phase 1: Problem Definition and Algorithm Design (5 points)

Due Date: Saturday, 15/11/2025

Objectives:

- Initiate your team.
- Identify a real-world problem suitable for algorithmic solutions.
- Conduct literature reviews to explore existing algorithms and approaches.
- Define the problem clearly and outline the requirements for the solution.
- Design an initial algorithm to address the problem, including pseudocode and flowcharts.

Deliverables:

- A comprehensive project proposal document that includes:
    - Team members
    - Problem statement
    - Literature review summary
    - Proposed algorithm design with pseudocode and flowcharts

Phase 2: Implementation and Testing (5 points)

Due Date: Saturday, 6\12\2025

Objectives:

- Implement the proposed algorithm using a programming language of choice.
- Develop test cases to validate the algorithm's functionality and efficiency.
- Perform initial testing and debugging to ensure the algorithm works as intended.

Deliverables:

- Source code for the implemented algorithm.
- A testing report that includes:
    - Description of test cases
    - Results of testing and any issues encountered
    - Performance analysis (time and space complexity)

Phase 3: Optimization and Final Presentation (10 points)

Due Date: Saturday, 27/12/2025 (presentations 28/12-31/12/2025)

Objectives:

- Analyze the performance of the implemented algorithm and identify potential bottlenecks.
- Optimize the algorithm to improve efficiency.
- Prepare a final report and presentation summarizing the entire project journey.

Deliverables:

- An optimized version of the algorithm with accompanying source code.
- A final project report that includes:
    - Introduction and background
    - Details of the design and implementation process
    - Optimization strategies and results
    - Conclusion and future work suggestions
- A final presentation to showcase the project, including the problem, solution, and learnings.

Conclusion

This project aims to deepen students' understanding of algorithms through practical application, encouraging collaboration and critical thinking. Each phase builds upon the previous one, guiding students from problem identification to solution optimization and presentation.