Final Project: Applied Optimization

1.1 Overview

The assignments for this course include a final course project undertaken by you, the student. This project will involve applying the principles and ideas introduced in the course to solve an engineering problem using mathematical optimization with an implementation in a suitable language. The approach you use cannot have been published or shared in any form so far, nor be a minor modification of such an existing one.

1.2 Teams

Projects must be completed individually.

1.3 Grading

The project accounts for 40% of the final grade. The total score on the project is 100 points. These points are earned by you through completion of the following tasks:

- Submitting a project proposal and a revised proposal: 20 points
- Completing two project reviews with draft reports: 40 points
- Completing a final demonstration: 20 points
- Submitting a project report and participating in a final project review session: 20 points

1.4 Project Proposal

You must submit a written proposal (up to 2 pages in length) describing their planned project work. The expectation is that the proposed project uses the course material to create a program that can solve a worthwhile instance of an engineering problem relevant to you.

You have significant freedom to define an appropriate topic. You must submit a preliminary proposal and a revised proposal describing the idea. These proposals must contain a verbal and a mathematical formulation of the problem.

If an internet search returns a project virtually similar to your planned one, select a new one, or propose a significant modification.

1.5 Project Reviews

As the project progresses, students must complete two reviews of their work and progress before the final demo. These reviews also present an opportunity to redefine the project scope and goals. The reviews will also evaluate the draft of your project report.

1.6 Final demo

The project requires a final demonstration of the work. This demonstration will include a presentation describing

- the engineering problem,
- its importance to you,
- a mathematical expression of the problem,
- a discussion of solution techniques (highlighting your unique approach),
- a visualization of the resulting solution, and
- an interactive component where the audience can modify parameter values or add modifications and you provide an updated solution and visualization. If the typical running time of your method exceeds a few minutes on the problem relevant to you, prepare an additional simplified version for the interactive component.

For example, if your project solves a network design problem, then the audience may request a new solution under removal of certain nodes or modification of node or edge parameter values. Inability to handle any modifications will result in a low grade.

1.7 Project Report and Review

The project requires submission of a project report describing the project work and outcomes of the project. Students are required to begin writing the project report in parallel with the review process. The report will be the basis for a final review discussion with the instructor.