ME 575: Final Project Guidelines

1 Overview

One of the primary goals of this course is to prepare you to understand and apply state-of-the-art optimization algorithms to applications in research and industry. The final project is an opportunity for you to explore an area of interest to you, and to develop and demonstrate deeper understanding. The milestones for the project are:

Abstract: due Jan 29 by 3 PM

Draft report: due Mar 25 by 3 PM

Presentation: Last week of class

Final Report: due Apr 14 by midnight

2 Topic

The project is open-ended as long as it is related to the subject material of the class. If you need help brainstorming ideas please talk to Dr. Ning, the TA, or your advisor. Your project may involve applying existing optimization algorithms to an application of interest, or may involve developing novel optimization strategies or algorithms.

Explore previously published research papers in your field of interest for inspiration. If you are involved in research outside of the classroom, you may consider a project applying optimization to a part of your existing research efforts. You will only receive credit for the work you do for this class. Incorporating work performed previously is a good idea, but if you do so you must clearly specify what work was done *this* semester for *this* project. Tying this project in with your research is encouraged but certainly not necessary. The most important criteria is to pick a topic that you are excited about. Don't be afraid to be ambitious!

3 Collaboration

You can work in teams of size two or three. Collaboration skills will be critically important in your career. You may work individually only with my approval and only if it is supporting your individual ongoing research project and does not lend itself well to additional collaboration. To be clear, working on an ongoing research project does not necessitate working individually.

When forming teams make sure your project is properly scoped for the team size. Larger teams need a larger scope. Each person should have an equal but different role that they can take ownership on. This is especially important if tying in with one of the team members existing research. For example, a successful two person project worked on wind farm optimization where one person focused on aerodynamics and another on acoustics. This project would have been less successful as a 3-person team where 2 focused on aerodynamics and one on acoustics. If adding a third person, the scope should be increased and add another area of contribution (e.g., structural analysis, financial modeling, uncertainty quantification, etc.). The most common problem I've seen is with 3-person teams where separate contribution areas are not identified up front and one or two of the members contributes less.

As detailed in the project supplemental form you will be asked to rate your contribution and that of your peers (as a percentage). You will be penalized if you contribute significantly less

than expected (i.e., 50% for a 2-person team or 33% for a 3-person team). I do not expect a perfect balance, but do expect a balance within a ±5% margin of uncertainty (e.g., 45/55 would be considered balanced). For the vast majority of past teams this is not an issue. To compute your project score I will first compute a separate team score. Then I will average the contribution estimates from all team members and then give you the benefit of the doubt with an added 5% uncertainty margin. Your score will be computed using this formula:

$$\text{individual score} = \text{team score} \times \min\left(\frac{\text{contribution} + 5\%}{\text{expected contribution}}, 1\right)$$

For example, suppose you were on a 3-person team and your team score was 98%. If you contributed at least 28.3% or greater than your individual score would also be 98%. But if you contributed less (e.g., say 25%) then your score would be

$$98\%\left(\frac{25+5}{33.3}\right) = 88\%$$

4 Milestone Details

For each submission each member of the team should **submit their own copy** via Learning Suite. That will allow me to provide direct feedback to each member of the team.

4.1 Abstract [20 points]

Submit a one-page PDF on Learning Suite containing your project title, the names of your team members, and a 300-500 word description of your proposed project.

4.2 Draft Report [40 points]

Your draft report is due about three weeks before the final report. It should be in PDF format, be no more than 5 pages, and contain a draft introduction, methodology, some preliminary results, and some preliminary conclusions. This milestone is designed to make sure you are on track and to provide you with feedback.

4.3 Presentation [40 points]

You will sign up about a month before presentations for a 10 minute presentation time slot.

- Group projects will have 8 minutes to present and 2 minutes for Q&A.
- Individuals will have 6 minutes to present and 2 minutes for Q&A.

Obviously you will not have a lot of time to spend on details. Instead, you should focus on motivation (what the problem is and why it is important), solution approach, and the most important results. Each member of the team should have a role in the presentation.

4.4 Final Report [150 points]

I will evaluate your final report using the same criteria that I would use in evaluating a prospective journal article.

Relevance: Is this a relevant problem of importance in your field of interest?

Impact: Is the work novel and a potentially useful contribution to the field?

Organization: Is the writing clear and logical? Are figures and tables well-presented?

Quality: Is the work of good quality and technically accurate?

Your report should be in PDF format, be no more than 10 pages (not including references), and should contain the typical elements of a journal paper including an abstract, introduction (including a discussion of prior work), methodology (in sufficient detail that a practitioner could reproduce your results), results (including a detailed discussion on their meaning and relevance), conclusion, and references. If you have lots of symbols you might consider providing a nomenclature section. Format your paper in the journal style of your field. If you don't have a particular field, use the AIAA style. Most journals (including AIAA) provide LaTeX style files and/or MS Word templates.

Each team members needs to fill out and submit the "Final Project Supplemental Form" that is posted on Learning Suite. This form allows you to detail your role and contributions from others. You will not receive a grade for your final project until your supplemental form is submitted.

5 Miscellaneous

- Some of you will have final reports that will be nearly publication ready. If appropriate, I encourage you to consider spending the effort after the class is over to prepare your work for submission to a conference or journal.
- The quality and clarity of your writing is very important. Your career will likely involve lots of writing. I encourage you to solicit feedback early and often. The BYU Writing Center is one excellent resource available to you.