

16. Class project

- Class project
- Project ideas

Class project

Goal: Create an IJulia notebook that explains, models, and solves a problem using techniques we learned in class.

- Project proposal: **Friday March 29**
 - ▶ Choose a group (2 or 3 students)
 - ▶ Choose a topic and write a short description.
 - ▶ Not graded, can change it later.
- Final report due: **Tuesday April 23**
 - ▶ Each group turns in one IJulia notebook
- Prize!

Final report (300 points)

- 1. Introduction (15%, 45 pts):** Background information on the problem. Should include a brief history (with some citations) as well as current uses/applications. (accessible to anybody)
- 2. Mathematical model (20%, 60 pts):** Derivation and explanation of the optimization model that represents the problem. Explain approximations, etc. (accessible to any student in the class)
- 3. Solution (25%, 75 pts):** Code that solves the problem in JuMP and displays the solution. Should be well explained and commented.
- 4. Results and discussion (25%, 75 pts):** Show figures, plots, images, trade-off curves, or whatever else you to best illustrate your results. Explain what the results mean and how to interpret them. Explain the limitations of your approach/model and how sensitive your results are to the assumptions you made.
- 5. Conclusion (5%, 15 pts):** Summarize your findings and your results, and talk about at least one possible future direction; something that might be interesting to pursue as a follow-up to your project.

The final 10%

The required sections of the report add up to 90%. The remaining 10% of the project grade (30 points) are bonus.

- Awarded at my discretion for: originality, creativity, and final report quality.
- You don't need to come up with your own project idea to be creative/original. It's about where you take it.
- These points are very hard to get. The median bonus score will likely be 0 (most projects will not earn bonus points).

Topics

- An example we saw in class. Of course, this would just be a starting point.
- Something you found online or in a book, e.g. Boyd's notes. Be sure to include relevant references. Again, think of this as a starting point.
- Your own idea (pending my approval). Can be something you come up with, or related to research you've done, etc.
- **Academic integrity:** Cannot reuse a project you've already completed for another class or for research. If you have doubts, ask me!

Guidelines

- This class is about **modeling**, not data collection! There are no extra points for solving a particularly large optimization problem or for using “real data.”
- Sensible idea: solve a “toy problem” first, then work your way up to bigger and/or more realistic instances or your problem. Don't try to solve it all at once.
- Stay away from issues involving algorithm design, tuning, or selection. Focus on the model.
- Stay away from large-scale problems with many local minima (not much to do from a modeling standpoint). No physics/materials simulations and no deep learning!