

530.215 MECHANICS-BASED DESIGN

General Solution Format for Design Problems

1. Solutions to a Design Problem should be no more than 6 pages long, including the sketch.
2. *No Design Problem should take more than five hours to solve – if you spend more time than that, you are doing too much.*
3. State the intended market, and identify critical ethical and legal issues.
4. State what you know about the problem. What are the constraints on the system or component? Some of those constraints will arise from the issues discussed above.
5. Define the design problem in terms of engineering design criteria. These criteria should be listed in bullet format, so that it is easy to check whether you have in fact met these criteria with your final design. State explicitly any assumptions that you make.
6. List concepts that you considered before settling on your final design.
7. Provide a drawing of your design. This must be a neat drawing, preferably but not necessarily printed. It must include dimensions, and a key or labels to be able to connect the drawing with your description of your design.
8. Provide a stress analysis of your final design, identifying critical points where failure is likely to occur (these should be indicated on the drawing as well). The analysis should include specific equations, the rationale for the use of those equations, references if we have not used these equations in class. **Put down the equations before you substitute in numeric data.** The dimensions you have in the drawing, and the choice of materials, must be a consequence of this stress analysis. Define the factor of safety that you have attained based on your analysis and your choice of materials and dimensions (this is what motivates that choice).
9. Provide a list of parts, components or materials needed to make your design. Define the source of those items (e.g., McMaster-Carr). Put this list on a separate page – you may use a print out from the order section of McMaster-Carr. This should include costs.
10. Discuss the overall cost of your design, and how this relates to your intended market.
11. Demonstrate that your design meets your engineering design criteria. State your final factor of safety.
12. Be neat, legible, and clear in your presentation.