**ME302 Refrigeration Term Project** Due 12/5

As an engineer, you must be able to take a real system and simplify that system into a solvable problem. To that end, for your project you will be participating in an experiment from Advanced Rater Training, taking measurements from the refrigeration system, then creating and solving a systems integration problem.

ABET and Industry have commented that engineering communication is a key skill they look for in our graduates. To foster this, please write up a memo – up to 2 pages – describing your experience with this experiment and defending the assumptions you made for your problem. Your memo should talk about how you came up with your problem statement and what you had to go through to solve the problem. I’ll refer to this as “Memo A.”

You will also need to be able to understand and evaluate your peers’ work – either as vendors, contractors, or customers. To practice this skill, you will be exchanging and reviewing problems. On your peer review, you will independently solve the problem and comment on your peer’s technique and review their Memo A, you will also comment on changes they suggested and the changes you made. I will refer to this write up as “Project Reflection.”

**Experiment Day!**

The experiment will be performed outside BD13-124. Meet there at your experiment time.

There will be no regular class 11/19. Safety concerns: none.

**The Project:**

**You are writing TWO problems – one real, one with a fun change.**

You will collect data on the refrigeration system. The base goal is to get this system properly modeled like a thermodynamics book problem. Make sure you find all the pressures and temperatures you will need to make a refrigeration cycle problem and understand where each part is and what it looks like. Make sure you know mass flow rates. **Then** you may take some creative liberties and change your problem. For example, compare the base system to one with a different fluid. Maybe use a different compressor. Compare it to the Carnot equivalent system. Add a component. Again, you will write two problems: the real one, and one you’ve changed in some way.

**Trading and Peer Review:**

I will assign you a partner. You will submit your project in advance of the due date (hopefully by 11/24 at the latest) to your partner. You will then proof read and independently solve your partner’s problem. Your job is to maximize their score. This is a real world skill – read and review another engineer’s work. Also review their Memo A.

**Reflection:**

After peer review, trade back and correct your project. Then think about the project process. What have you learned? What results were valuable? What would you change? How did you like the experiment? The independent work? The trading and peer review? Reflect on the whole process in whatever fashion you like.

You will be submitting your draft, your peer’s review, and your final.

**Summing Up:**

1. First get your homework done!
2. Attend your experiment time on 11/18 or 11/19.
3. Create and solve 1 system integration problem using the information and data taken during your experiment. Try to make your problem on the same level as problem 6.159 or 6.163 in the text. Use your best problem solving format! (Hint: Type as much as you can.)
4. Write a Memo (A) describing your experience, assumptions, and solution method.
5. Solve and evaluate 1 peer system integration problem and memo. Your solution can be as long as necessary. Your Project Reflection goes to me, and can be whatever format you like.
6. Revise your project after getting comments from your peer, this will be your final draft.

On 12/5, you will turn in paper clipped/binder clipped **with your partner** in this order: (Please do not use staples)

(Assume your names are “Alice” and “Bob”)

**In Clip 1**

Section 1a: Alice’s Project Reflection

Section 2a: Alice’s Solution of Bob’s problem

Section 3a: Bob’s Final Memo A

Section 4a: Bob’s Final Problem Statement

Section 5a: Bob’s Final Solution

Section 6a: Bob’s Rough draft of everything with Alice’s comments

**In Clip 2**

Section 1b: Bob’s Project Reflection

Section 2b: Bob’s Solution of Alice’s problem

Section 3b: Alice’s Final Memo A

Section 4b: Alice’s Final Problem Statement

Section 5b: Alice’s Final Solution

Section 6a: Alice’s Rough draft of everything with Bob’s comments

I have provided the rubric for this project on the back of this page.

**Thermo Term Project: Rubric**

**/15 Points Project Reflection**

Points for:

 5 Discuss Changes you made to your project as suggested by your peer.

 5 Discuss changes you suggested TO your peer.

 5 Talk about overall thoughts and opinions / concluding remarks about project.

**/15 Points Peer Solution and Evaluation**

 5 Did you solve your peer’s problem neatly and give it a good effort?

 5 Did you mark up your peer’s work (problem statement and solution?)

5 Did you review your peer’s memo?

**/20 Points Memo A**

 5 Memo Format (spelling, grammar, and stuff)

 5 Discuss your personal thoughts and experiences.

 5 Defend some of your assumptions (not a listing of assumptions).

 5 Talk about what you did for coming up with your problem statement.

**/30 Points Problem Statement**

 *Must be two systems integration problems*

 Must force the solver to solve for all state points

 Must use entropy/losses/isentropic efficiencies

 Must be an appropriate level

 - 5 points for “bad things”

+5 points for “good things”

**/40 Points Solution**

-5 for “bad things”

 +5 for “good things”

 Make sure the temperature/enthalpy changes across the compressor…other conceptual problems

 Check for given, find, assume, schematic.

pv-Ts diagrams

 Present work, units, and table look ups.

 References.

Data Sheet from Experiment Day.

**/10 Points From Peer Evaluation**

**/130 Total**