Final Reflective Letter

After completing this course, the student should be able to:

• Describe the nature of fluids and define different fluid properties such as viscosity and pressure;

Throughout this course I have completed several assignments that show my grasp of the fluid properties, and their relationship to pressure. A good example is homework 1.3 (hyperlink), where I use bernoullis in conjunction with density and viscosity.

• Compute pressure and the forces (magnitude, location, and direction) associate with it in a stagnant fluid;

I learned about how stagnant fluid reacts to and acts upon the world around it by relating my previous experiences to the new concepts being taught in the class. My understanding of the concepts are shown best in homework 2.1 (hyperlink).

• Discuss what buoyancy is and determine object stability while floating or submerged in a fluid;

When learning about buoyancy, I already had a pretty good understanding of it, the only detail I was really missing was the formula to connect the concepts I had already seen at work to the work I had to do from the book. I actually got to teach the concepts of buoyancy through an engineering-education project where I worked in conjunction with engineering and education students to design a lesson that would interest kids and get them to learn about buoyancy. The work done on this can be seen here (hyperlink).

• Explain the fluid dynamics in pipes and fittings;

Learning to take into account minor losses made a lot of the previously learned concepts in the class a lot more complicated for me, and I ended up needing to put a lot of time into it to learn the concepts. I believe it's easy to see from homework 1.4 (hyperlink) that I sort of understood the concept but was struggling, and from test 2 (hyperlink) you can see that I had made a lot of progress towards understanding how to properly apply equations to fluid dynamics in pipes and fittings.

• Apply the principles of conservation of energy (Bernoulli's equation) and mass to fluid flow systems;

Using Bernoulli's equation was one of the most important things to learn in the whole course and I enjoyed seeing how it was supposed to balance out every time. To begin with I had some trouble doing the algebra I needed to do in order to isolate variables that I needed to solve for, as can be seen in Test 1 (hyperlink). But after practicing a lot I found it easier to use, and was even able to use it for the more complicated equations, as can be seen in homework 3.1 (hyperlink)

• Compute friction losses in pipes for a variety of configurations (series, parallel, network, etc.);

Computing friction losses wasn't originally very difficult when it was being taught for series configurations of pipes, because it made sense and connected with the previous concepts I had been learning. Once I had to begin learning about parallel and network configurations, minor losses became way more difficult because I never had enough variables. Learning to iterate was definitely a challenge in the beginning because I hadn't ever used Excel that way before, but once I learned how to I found it a lot easier than some of the other concepts we learned in class. Although it took time for me to understand, my ability to compute friction losses for a variety of configurations is most shown in Test 3 (hyperlink)

• Identify and solve for different very specific industrial problems, such as, open channel flow, cavitation, water hammer, drag, lift, forces in pipes, and learn about different instruments to measure fluid flow quantities (such as, pressure, fluid velocity, flow velocity, etc.);

All of these concepts were interesting to me, and although I did learn about all of them through the class, I did not get to show off my knowledge for all of them. I did find them relatively easy to understand and showed my understanding through homework 2.2 (hyperlink) and test 2 (hyperlink).

• Explain how fluid-machinery work (focused on pumps);

Although the time that we went over things like pumps was short, I found it very interesting the way the concepts we learned were being applied in a mechanical way to make things go the way we design them to, rather than chaotically. There weren't a lot of places I could have shown off my knowledge of pumps, but I did a little in homework 3.3 (hyperlink)

• Compute and select the appropriate pump for different pipe system configurations.

Learning to read the chart for pump selection based on the needs of different systems wasn't particularly difficult, but learning why different systems needed to have a different kind of pump and applying that to the concepts behind the chart took longer to learn, but made it easier to understand the chart in general. I only really got to show off my understanding of it in homework 3.3 (hyperlink).

1) Where is your learning demonstrated in the course?
    All tests (hyperlink)
    The tests best show the work I have put into learning the concepts, especially the 3rd

2) What areas did you feel you were most successful, or improved the most?
    Test 1 (hyperlink)
    Although my grade does not reflect it, I immediately went back and relearned it all

3) How do you see this course's content intersecting with your field or career?

Project related (hyperlink)

All the concepts learned will be useful background knowledge, like in the project

4) Have you been able to apply concepts you have learned in the course to what you do at work or in other courses?

Test reflection 1, Test reflection 3 (hyperlink)

Both of my reflections agree that I have used some concepts in thermal applications

5) How, when, where and why you might use this information or skill in the future?

Test reflection 1, Test reflection 3 (hyperlink)

Both of my reflections agree that I will use this for both career and personal projects

6) Do you think what you learn is important for your professional career?

Test reflection 1, Test reflection 3 (hyperlink)

As I say in both reflections, it absolutely will be

7) Where do you think you will be using everything you learned?

Project (hyperlink)

Somewhere that I can help people and use engineering like the project

8) If you were starting this class again, what advice would you give yourself to ensure that you had a successful semester?

Homework 2.2 (hyperlink)

Go get help outside of class hours if something is confusing you

1) After taking this class, in what ways have you improved as an engineer? What brought about those improvements?

After this class I have found myself being a lot more methodical with my planning and a lot better at looking at the project as a whole by applying all the concepts I have learned rather than just a few. Both of these qualities I have found to be very beneficial when it comes to any engineering project I am doing by helping me pay more attention to detail without compromising any other part of the project. Although not strictly seen as engineering improvements, I have found that I am better at working in a team because of the improvements to my communication as well as leadership skills. I believe that the engineering skills were learned largely in the classroom as well as when completing the tests, which served as a learning tool themselves. The other skills I believe I picked up during the course project, where I had no choice but to learn to communicate with people I did not have much experience with, and lead my peers in a way that wasn't too loose by learning to lead effectively.

2) What was your biggest accomplishment in the course? Be specific with respect to your work and the topics you learned in the course.

I think that my biggest accomplishment was the last test, which covered a few of the topics we had gone over throughout the class with a focus on minor loss and iteration. I believe that it shows the effort that it took for me to learn all of the concepts up until that point, and shows that not only did I learn them individually, I also learned them enough to be able to apply them to a real world situation. It is also the test that I spent the most time on, as I wasn't satisfied with the answer I had gotten and spent a lot of time going over my work over and over again.

3) What skills did you master in this course? How are they reflected in the assignments (HW, tests, etc.) Be specific.

I believe that I mastered the use of Bernoulli's equation, as can be seen in almost all of my work, I struggled with but eventually mastered minor losses, as can be seen in test 3 (hyperlink), I mastered the gamma H equation and forces of stagnant fluids, as can be seen in homeworks 1.1-2.2 (hyperlink) and test 2 (hyperlink). Although I did not get to directly show it, I did eventually master the concepts of flow rate and friction losses, as can be seen in test 1 (hyperlink), I had not quite understood them at the time.

4) What do you feel are your strengths and weaknesses? Explain while making specific references to your work.

I think my biggest weakness is not being able to draw correct assumptions about a system, as can be seen in Test 2 and Test 3 (hyperlink). For example in test 3 I assumed that I had included all the different minor losses into my equation, however I had missed one or two, and when I went back over my work I didn't think to check that because I assumed I had accounted for them all. My biggest strength was committing to double checking my work until I had a satisfactory answer, as can be seen in Test 3 (hyperlink) and most of my homeworks (hyperlink). I was usually not correct the first time I attempted a problem so I found it to be incredibly beneficial to go back and check my work, especially when the answer that I calculated didn't line up with the estimate that I had made in my head.

5) How did you think about this course before you took it and how you think about it now that it is over? How many of your assumptions or understandings changed? Why?

I was originally excited but a little afraid of taking fluid mechanics. The idea of trying to apply the physics I had already learned, which was applied pretty exclusively on rigid bodies, seemed a bit daunting and I was worried I wouldn't quite understand. Since taking the class I find that I shouldn't be so worried about learning new things, even if they do seem out of my depth, because there's always a way to relate it to something I already knew and make it easier to learn. I also thought the course would go over hydraulics, that assumption changed as well.