Pre-lab Homework

1. Write down the overall energy balance equation for the system. What quantities will you need to measure in order to check the energy balance? Why is it important to check the energy balance for each data point in the experiment?

2. Can temperature of the cold water at the outlet be higher than temperature of the hot water at
   (a) the inlet,
   (b) the outlet?
   Justify your answer.

3. What is the overall heat transfer coefficient $U$ of a heat exchanger? Describe how you will measure $U$ experimentally compute it theoretically.

4. What component of the overall heat transfer resistance (convective or conductive) do you expect to be dominant? Explain why.

5. List factors affecting the convective heat transfer coefficient. Which of these factors will be varied in this experiment? Explain how you will vary these factors and explain why these factors affect the convective heat transfer coefficient.

6. The heat exchanger system in the lab displays values of the inlet and outlet temperatures of the hot and cold fluids and the volumetric flow rates of the hot and cold fluids. Create a table to be used in the lab to organize and track the data you need to find the overall heat transfer coefficient. (This question is not for credit, but it will help you with the lab.)