# HEAT EXCHANGER FLOW PROBLEM - WEEK 3

*The following handouts will guide you through carrying out an investigation across three weeks into the scale-up of a heat exchanger from benchtop approximations to a full scale plant-based shell and tube heat exchanger.*

During Week 1 & 2 you investigated the Reynolds number and its effect on heat transfer. This week you will determine the dimensions of a heat exchanger required to carry out a specific heating duty for a plant process.

Following this week you will write your final deliverable as a group, a written report incorporating data across all 3 weeks of your project.

## Pre-lab Materials

*You are required to watch these videos and read these documents before arriving to the labs. These materials will help you be fully prepared for the tasks required in week 3 of your labs*

**Effectively Design Shell-and-Tube Heat Exchangers**
https://bb.imperial.ac.uk/webapps/blackboard/execute/content/file?cmd=view&mode=designer&content_id=_2389465_1&course_id=_29289_1

## Day 1 & 2:

You will need to design a heat exchanger capable of heating 100 kg $hr^{-1}$ of water from 25 °C to 85 °C. You can carry out this investigation any way you wish. You may want to consider:

- Testing the limits of the current system? Can this heat exchanger carry out this heating duty? If so, explain how and suggest the minimum size of heat exchanger feasible
- If the heat exchanger cannot carry out this heating duty why? Does it need to be larger? Flow regime not optimal for mixing? Is the heating duty even feasible at all?
- Consider if the overall heat transfer coefficient can be calculated more accurately? Can the Nusselt number be found in any other way?