**GROUP MINI PROJECT (Week 7 – Week 13)**

TESCO Seri Iskandar is selling a large volume of wet food, which mainly consisted of meat and fish section AND fruit and vegetables section. At the moment, we are not sure how they disposed the expired items. Nonetheless, as a chemical engineer, surely we can find many environmentally friendly, yet cost effective ways to ensure we can convert these waste into wealth.

In your team, you are required to figure out how you could solve these issues. Listed below are the requirement of your project:

1. Identify how much waste is being produced on daily basis (in kg or volume)
2. Conduct a literature survey of how these waste can be turned into wealth opportunity. Specify:
   1. The varieties of available technologies
   2. The reactions involved
   3. The researchers or practitioners that made these technologies successful in their local area
   4. The pros and constraints of these technologies
   5. The way forward that would help your project
3. Identify the technology that you’d like to propose –
   1. What is it?
   2. Why do you choose this technology? Why not others?
   3. Is it a sustainable technology? (balanced between economy, social and environment).
   4. Is there any catalyst involved? What type of catalyst? How much is required?
4. Conduct a mass balance of the proposed technology (block diagram and mini process flow diagram (PFD) are recommended at this stage) – you may want to use ASPEN HYSYS to assist your mass balance calculations.
5. Design the reactor that will be used in the proposed technology,
   1. What is the type of reactor to be used?
   2. What is the size of the reactor?
   3. Operating temperature and pressure?
   4. Does it require any heating/cooling? How do you provide that?
   5. Produce a mechanical drawing of the reactor
   6. Cost of the reactor (Refer to Coulson & Richardson Volume 6 or any chemical engineering design textbook to get the formula)
6. Include the control element that you need to install in operating the reactor and specify your justification
   1. What is the transfer function for the reactor?
   2. What is the order of the transfer function?
   3. Identify the control variable(s), manipulated variable(s), and possible disturbance variable(s) for the reactor.
   4. What type of control algorithm (P, PI, or PID controllers) would you use? Why?
7. Conduct Hazard and Operability Studies (HAZOP) of the reactor to identify any special safety features to be installed in your proposed reactor
8. Draw a mini Process and Instrumentation Diagram (P&ID) of the complete proposed system. Propose the installation site of the technology that you recommend.
9. All the drawing and proposed technology to be included in your e-portfolio.
10. Each member need to specify their contribution in these second project in their respective biodata
11. Each member also need to conduct reflections on the following things:
    1. Each subject up to Week 13
    2. The 2nd group project reflection
12. Concept map for these three subjects need to be ready by Week 13
13. The milestones of this project are as follows:

**Early Week 7** – project briefing

**End of Week 8** – identify the waste and quantity of the waste produced

**End of Week 11**

– technology is identified with complete literature survey (max 5 pages written with references) + mass balance is conducted + PFD& Block Diagram is ready (to be shown in e-portfolio)

– reactor is designed with complete control elements (to be shown in e-portfolio)

**End of Week 12** – HAZOP and P& ID are completed (to be shown in e-portfolio)

**End of Week 13** – E-portfolio is ready to be viewed for submissions (with complete reflections and concept map for each subject) .

1. The components that we evaluate are as follows:
   1. Literature Review – 10%
   2. Identification of the Technology with sustainability justification– 10 %
   3. Mass Balance, block diagram & PFD (including simulation via ASPEN HYSYS)– 10 %
   4. Reactor Design / Control / HAZOP– 40% (KRD- Reactor Design, CPDIC – Control design, PSLP – HAZOP), each is 40% with respect to each course
   5. P&ID and equipment drawing – 10 %
   6. E-Portfolio, Reflection & Concept Map – 20%